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A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model

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A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model

Richard S. Whitt*

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EXECUTIVE SUMMARY

Time for a New Approach

U.S. policymakers face a virtual conundrum: how best to incorporate the new Internet Protocol ("IP")-centric services, applications, and facilities into the nation's pre-existing legal and public policy construct. Over the next several years, legislators and regulators will find themselves increasingly challenged to make the Internet adapt itself to the already well-defined bricks-and-mortar, services-and-technologies environment that exists today under the Communications Act and other statutes.

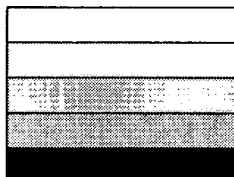
Some argue that new IP services should be "shoe-horned" into the existing requirements of the legacy system, despite the poor fit. Others believe that new classifications and definitions can be created within the confines of legacy regulations. In this Author's view, however, the optimal solution is to turn the conundrum around on itself, and to begin adapting our legal thinking and institutions to the reality of how the Internet is fundamentally changing the very nature of the business and social world.

In this Article, the Author will explain that trying to impose the current, outmoded legal system onto the Internet and all its IP progeny is a flawed, damaging, and ultimately doomed approach. Instead, policymakers should adopt a new public policy framework that regulates along horizontal network layers, rather than legacy vertical silos.

Market Reality: Horizontal Networks (Layers)

For decades, packet-switched data communications networks have been constructed around several fundamental organizing principles, including the “protocol layering” concept (networks employ different functional rules, or protocols, arranged in layered stacks) and the “end-to-end network” concept (dumb networks support intelligent applications). Together, protocol layering and end-to-end principles have become the building blocks of the Internet. In the resulting layered protocol stack, the IP resides in the “middle” logical layers, with physical network facilities at layers below and user applications and content at layers above.

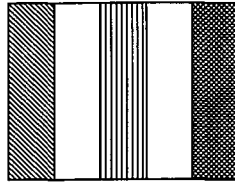
As technology has evolved, existing networks and markets have begun converging to common IP platforms. Key inherent aspects of this IP-centric New World Order include blurred distinctions between services, lack of relevant geographic boundaries, and a mesh of virtual interconnected networks. Moreover, this network architecture tends to shape and drive business fundamentals.



Legal Legacy: Vertical Rules (Silos)

While networks and markets have been evolving towards an all-IP world, the U.S. legal and regulatory framework remains stuck in the past. The Communications Act and implementing rules divide up the landscape based on traditional service, technology, and industry labels, such as wireline telephony service, wireless telephony service, cable television service, broadcast television and radio service, and satellite broadcast service. These divisions assume clear, unwavering distinctions, with different categories defined by the assumed static characteristics of discrete

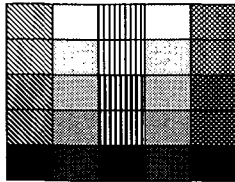
services or networks. The result is an inflexible approach of isolated “buckets” or “silos” governed by black-and-white, all-or-nothing thinking.



Problem: Unworkable Overlays (Gridlock)

The resulting clash between data networks constructed of horizontal protocol layers, and the legal and regulatory artifice of the vertical silos, inevitably leads to uncertainty, confusion, and gridlock on all sides. Our fractured laws and regulations fail to reflect the reality of the converging markets and networks. Policymakers attempting to impose current legal standards on the Internet quickly run afoul of its powerful governing dynamic, which shatters all of the past service, definitional, technological, and geographic limitations.

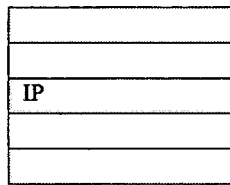
As a result, legacy distinctions largely lose their meaning in this all-encompassing IP world. More critically, forcing legacy regulations on IP services and networks stifles the creativity and innovation that is the essence of the Internet. Outmoded regulations tend to impose unnecessary legal restrictions in some cases, as well as overlook significant market concentration issues in other cases.



Solution: Rules and Networks Aligned (Layers)

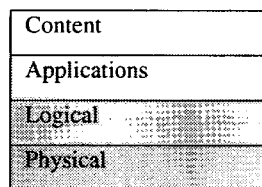
To avoid the risk of further serious damage, policymakers must move away from the increasingly outmoded vertical “silos” that artificially separate communications-related services, networks, and industries from each other. Informed by the way that engineers create layered protocol models, and inspired by the analytical work of noted academics and technology experts, policymakers should adopt a comprehensive legal and regulatory framework founded on the Internet’s horizontal network layers. We must build our laws around the Internet, rather than the other way around. By tracking the architectural model of the Internet—with IP at the center—we can develop a powerful analytical tool providing granular

market analysis within each layer, which in turn puts public policy on a more sure empirical footing.



The Proposed Layers Model Framework

The Author proposes a robust, yet flexible, set of layering principles built on the sound notion of “respecting the integrity of the layers.”¹ This framework encompasses both the “unregulated” e-commerce and e-business space, and the “regulated” telecommunications space. The proposed Network Layers Model conceptualizes four network layers—Physical Layer (with separate Access and Transport components), Logical Layer (IP), Applications Layer, and Content Layer. Such a framework helps achieve important public policy objectives, including: (1) avoiding unsupportable legacy distinctions between services, networks, and industries; (2) separating upper layers (user applications and content) from lower layers (physical and logical networks); (3) grouping and segregating pertinent public policy issues; (4) providing insights about the interdependence of different layers; (5) highlighting interconnection between networks and functional layers; (6) focusing selectively on curtailing pockets of market power within and between individual layers; and (7) preserving the “innovation commons” of the Internet.



In particular, when applied in the telecommunications industry context, the Network Layers Model targets the lower network layers for discrete regulation based on the existence of significant market power, rather than legacy service or industry labels. This framework concomitantly fosters maximum innovation by leaving otherwise competitive content and applications markets unfettered by regulation.

1. Lawrence B. Solum & Minn Chung, *The Layers Principle: Internet Architecture and the Law*, at 29 (University of San Diego School of Law, Public Law and Legal Theory Research Paper No. 55) (2003), available at <http://ssrn.com/abstract=416263>.

The Network Layers Model can be used to analyze and resolve discrete public policy issues, such as:

- *Internet content and transactions*—any attempts to limit or curtail Content or Applications Layer activities (legitimate or otherwise) should not result in Logical or Physical Layer regulation;
- *Broadband regulation*—last-mile Physical Access Layer facilities with significant market power should allow nondiscriminatory wholesale access to other service providers and applications;
- *Voice over IP (“VoIP”)*—IP communications reside as one of many capabilities at the Applications Layer, and should not be saddled with inappropriate Physical Layer regulation;
- *Interconnection*—any obligations to provide interconnection, including open interfaces between layers and networks, should be imposed at various layers based on the presence and degree of market power;
- *Universal service*—ultimate responsibility for the Federal Universal Service Fund (“FUSF”) requirement and contribution mechanism should reside at the Physical Layer.

Thus, the Network Layers Model can help reveal, clarify, and resolve thorny issues related to the legal upheaval caused by the advancing IP world.

I. OVERVIEW AND SUMMARY

This Article proposes that U.S. policymakers develop, apply, and promote a new network engineering-informed public policy framework for all IP-based services, applications, and facilities. The framework would be founded upon the multiple network “layers” or “levels” built into the construct of the Transmission Control Protocol/Internet Protocol (“TCP/IP”) stack. If adopted, the tailored principles established by the horizontal layers framework could be used to analyze the viability of specific legislative, regulatory, and administrative proposals. The principles also could provide a compelling new way to frame current policy issues in the larger context of non-arbitrary engineering functionalities.

The horizontal layers framework entailed in the proposed Network Layers Model would help further a number of important objectives in the public policy space, including:

- Creating a rational, sustainable legal and regulatory framework for the coming IP-centric world;
- Preventing the unwarranted imposition of legacy telecommunications regulation and new Internet Service Provider (“ISP”) liability obligations on IP-based applications, by the Executive Branch, Congress, the Federal Communications Commission (“FCC,” or “Commission”), the Federal Trade Commission (“FTC”), and other national regulators;
- Justifying preemption of intrusive Internet regulation by states and localities;
- Lessening or removing existing legacy retail regulation of competitive telecommunications services (such as traditional voice telephony service); and
- Focusing regulatory and antitrust attention and resources on the compelling public policy issue of fostering maximum competition in last-mile physical infrastructure.

In short, this Article proposes nothing less than a comprehensive yet flexible framework that policymakers should apply to all electronic transmission technologies and services supported by the TCP/IP suite. Moreover, the framework need not be confined to the world of the Internet, as the basic protocol topologies further described below apply equally well to other types of networks, including Plain Old Telephone Service (“POTS”) networks, as well as frame relay, Asynchronous Transfer Mode (“ATM”), Multi-Protocol Label Switching (“MPLS”), and Ethernet. At minimum, the network layers principle can have a separate function as a

useful tool for analyzing pressing issues in the e-commerce and e-business arena, as well as current telecommunications issues such as local competition, broadband regulation, IP-based voice communications (“Voice over IP” or “VoIP”), intercarrier compensation, and universal service funding. As a result, this Article proposes to incorporate the conceptual underpinnings of the layers principle into all facets of current U.S. communications-related public policy debates. Through the judicious use of this principle, public policy choices can be grounded not in vague theoretical abstractions, but in the ways that communications networks actually are designed, constructed, and operated.

Part I of this Article provides the pertinent legal and technical background. It also sets the stage for explanation of the “layers principle” in Part II, as described and endorsed by a small but growing number of legal, economic, and technology commentators. Part III applies the layers principle, as formulated most comprehensively by Professor Lawrence Solum, in the context of current e-commerce issues (Part III.A.). Because Professor Solum provides a thorough analysis of the layers principle in various e-commerce settings, the bulk of the Article introduces additional corollaries and analyzes regulatory debates in the traditional common carrier context, with a particular focus on broadband, VoIP, and other present-day telecommunications regulatory issues (Part III.B.). In this Author’s judgment, while application of the layers framework does not miraculously provide ready-made answers to every public policy conundrum, at the very least it does allow policymakers to start asking the right kinds of questions.

II. BACKGROUND

A. *The World of Legacy Communications Regulation*

In the “old” days before the Internet, the particular communications service offered and the underlying technology utilized essentially were considered as one and the same. For example, the copper telephone line carried voice telephony service, the coaxial cable line carried cable television video service, and radio waves carried broadcast television and radio services. Later, different radio bands were used to provide wireless telephony services and satellite broadcast television service. Communications-related industries, many of them monopolies or oligopolies, sprang up and developed around these technology platforms, and the particular retail services they provided to the public.

As a result of this previously unquestioned fit of message and medium, U.S. policymakers tended to organize the country's legal and regulatory superstructure around these "vertical" composite systems.² Notably the Communications Act of 1934, ("1934 Act") and subsequent amendments, bought into this notion of vertically-oriented regulation, and so we have different law provisions—such as Title II (telephony), Title III (television and radio communications and wireless communications), and Title VI (cable television) of the 1934 Act—that apply to different service/technology "silos."³ Not surprisingly, the FCC adopted the same schema when it formed the Common Carrier Bureau (now Wireline Competition Bureau), the Mass Media Bureau, and later the Wireless Telecommunications Bureau. Figure 1 demonstrates the resulting legal "silos."

2. See, e.g., Kevin Werbach, *A Layered Model for Internet Policy*, 1 J. ON TELECOMM. & HIGH TECH. L. 37, 39-40 (2002) [hereinafter Werbach, *A Layered Model*] ("Traditionally, communications policy was organized around horizontal divisions between service categories and between geographic regions."). Werbach's references to "vertical" and "horizontal" regulation in his paper essentially invert the terminology employed by other commentators, and in this paper, likely because he is referring to the "vertical" protocol stacks that are made up of "horizontal" layers. See also Douglas C. Sicker, *Further Defining a Layered Model for Telecommunications Policy*, Paper Presented at the Telecommunications Policy Research Conference ("TPRC") 4 (2002), available at <http://intel.si.umich.edu/tprc/papers/2002/95/LayeredTelecomPolicy.pdf> [hereinafter Sicker, *Further Defining a Layered Model*] (Traditionally "regulatory conditions are based on the type of infrastructure on which a telecommunications service is offered. . . . This regulatory structure is often referred to as the 'silo model' of regulation, in that each network and service is regulated separately from the other."); Jonathan Weinberg, *The Internet and "Telecommunications Services," Universal Service Mechanisms, Access Charges, and Other Flotsam of the Regulatory System*, 16 YALE J. ON REG. 211, 213 ("American communications law has developed along service-specific lines, with complex and distinct regulatory structures covering telephony (wired and wireless), broadcasting, cable television, and satellites."); François Bar & Christian Sandvig, *Rules From Truth: Post-Convergence Policy for Access*, Paper Presented at the Twenty-Eighth Conference on Communication, Information and Internet Policy 3 (Sept. 2000) ("Modern communication policy in most of the world has evolved to treat different media as islands.").

3. 47 U.S.C. tit. II, tit. III, and tit. VI (2003); see Sicker, *Further Defining a Layered Model*, *supra* note 2, at 4 (explaining that in the U.S. silo model, each network and service is regulated separately from the other, and "the top defines the regulatory Title"). Attorney John Nakahata calls this arrangement "regulation by service 'pigeonhole.'" John T. Nakahata, *Regulating Information Platforms: The Challenge of Rewriting Communications Regulation from the Bottom Up*, 1 J. ON TELECOMM. & HIGH TECH. L. 95, 100 (2002).

The Present “Silo Model” of Regulation

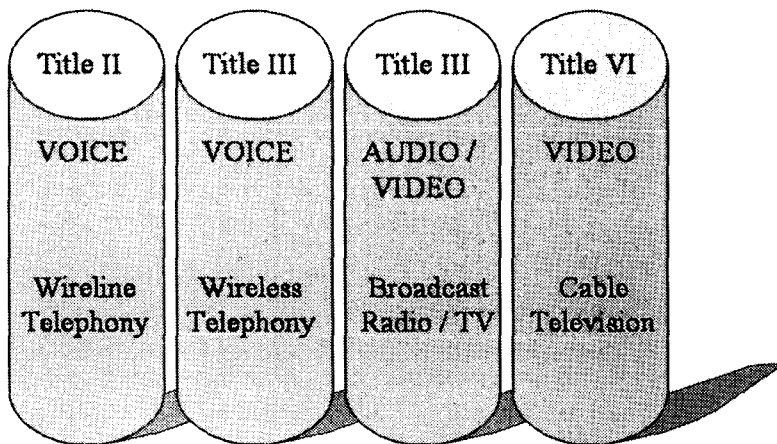


Figure 1

Beginning in the mid-1960s, the FCC took a first tentative step away from the vertical silos approach in the telephony space by separating out a certain category of new applications and services that happen to utilize basic telephony facilities. In the initial *Computer Inquiry* decision (“*Computer I*”), the FCC began wrestling with fundamental questions concerning the observed growing convergence between the “modern-day electronic computer” and “communication common carrier facilities and services.”⁴ Even at this early stage, the FCC had already recognized that computer-based services are separate from, and increasingly depend upon, communications services, and that a different regulatory regime was necessary to allow the nascent computing industry to compete without undue interference from government regulators or meddling communications carriers.

After several inconclusive starts, in 1980 the FCC issued its seminal *Computer II* order, which distinguished those services that should continue to be regulated as common carriage offerings under Title II of the Communications Act, from those services that utilize communications

4. Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities), *Notice of Inquiry*, 7 F.C.C.2d 11, para. 1, 8 Rad. Reg.2nd (P & F) 1567 (1966) [hereinafter *Computer I*].

inputs in a highly competitive, and unregulated, "value-added" services marketplace.⁵ The Commission classified all services offered over a telecommunications network as either "basic" or "enhanced." Put simply, "basic transmission services are traditional common carrier communications services" provided by telephone companies, and "enhanced services are not."⁶ More specifically, the Commission observed that basic service constitutes "the common carrier offering of transmission capacity for the movement of information."⁷ In contrast, an enhanced service must meet one of three criteria: it must (1) employ computer processing applications that act on the format, content, protocol, or similar aspects of the subscriber's transmitted information; (2) provide the subscriber additional, different, or restructured information; or (3) involve subscriber interaction with stored information.⁸ In all cases, an enhanced service by definition is "offered over common carrier transmission facilities used in interstate communications;" in other words, a basic communications component underlies every enhanced service, so that an enhanced service essentially "rides" on a basic service. Because enhanced services are provided in a competitive marketplace, the FCC decided to leave them unregulated.⁹

While the *Computer Inquiry* rules are remembered largely for the creation of these important definitional distinctions between regulated basic services and unregulated enhanced services, perhaps an even more critical decision followed. The FCC had the then-uncommon insight that because basic communications service constitutes "the building block" upon which enhanced services are offered, "enhanced services are dependent upon the common carrier offering of basic services"¹⁰ The Commission expressed concern that then-AT&T would have the motive and opportunity to provide unregulated enhanced services in a way that used its own underlying communications facilities and services in a discriminatory and anticompetitive manner. In order to protect against the potential for carriers to commit anticompetitive acts against Enhanced Service Providers ("ESPs"), the Commission required such carriers to unbundle and provide the underlying basic transmission services to all ESPs on a nondiscriminatory basis. The thrust of this requirement, the Commission explained, is "to establish a structure under which common carrier transmission facilities are offered by them to all providers of enhanced

5. Amendment of Section 64.702 of the Comm'n's Rules and Regs. (Second Computer Inquiry), *Final Decision*, 77 F.C.C.2d 384, 47 Rad. Reg.2d (P & F) 700 (1980) [hereinafter *Computer II*].

6. *Id.* para. 119.

7. *Id.* para. 93.

8. 47 C.F.R. § 64.702(a) (2003).

9. *Computer II*, *supra* note 5, paras. 100-01.

10. *Id.* para. 231.

services (including their own enhanced subsidiary) on an equal basis.”¹¹ This requirement “provides a structural constraint on the potential for abuse of the parent’s market power through controlling access to and use of the underlying [transmission] facilities in a discriminatory and anticompetitive manner.”¹² That requirement still applies today to all telecommunications carriers, including the incumbent local exchange carriers (“ILECs”).

Deservedly, much has been made of the crucial role that the FCC’s basic/enhanced distinction, and concomitant ESP “equal access” requirement, played in the ultimate birth and development of the Internet. Robert Cannon, for example, claims that the *Computer Inquiry* rules were “a necessary precondition for the success of the Internet” because they involved “affirmative and aggressive regulation of communications networks, specifically for the benefit of the computer networks.”¹³ Jonathan Weinberg states that the approach taken in the *Computer Inquiry* proceeding “was wildly successful in spurring innovation and competition in the enhanced-services marketplace,” because “[g]overnment maintained its control of the underlying transport, sold primarily by regulated monopolies, while eschewing any control over the newfangled, competitive ‘enhancements.’”¹⁴ In the same vein, Philip Weiser notes that the FCC’s insistence on non-discriminatory access obligations would “ensure that the telecommunications network could be used for a variety of services (e.g., Internet access) and that rival companies could market equipment like modems that could connect to the network.”¹⁵

Vint Cerf, widely acknowledged as a “father of the Internet,” also has pointed out how the *Computer Inquiry* decisions allowed thousands of players to “unleash their creative, innovative, and inspired product and service ideas in the competitive information services marketplace, without artificial barriers erected by the local telephone companies.”¹⁶ In Cerf’s judgment, “the Commission’s foresight in this area contributed strongly towards the commercial introduction, rise, and incredible success of the Internet.”¹⁷

11. *Id.* para. 229.

12. *Id.*

13. Robert Cannon, *The Legacy of the Federal Communications Commission’s Computer Inquiries*, 55 FED. COMM. L.J. 167, 169, 180 (2003).

14. Weinberg, *supra* note 2, at 222.

15. Philip J. Weiser, *Law and Information Platforms*, 1 J. ON TELECOMM. & HIGH TECH. L. 1, 12 (2002).

16. Letter from Vinton G. Cerf, Senior Vice-President, WorldCom, Inc., to the Honorable Donald Evans, Sec’y, U.S. Dep’t of Commerce, and the Honorable Michael Powell, Chairman, FCC (May 20, 2002), available at http://global.mci.com/us/enterprise/insight/cerfs_up/issues/broadband_letter.xml [hereinafter Cerf Letter to Evans/Powell].

17. *Id.*

Perhaps overlooked in this justifiable praise is the fact that the FCC had adopted what one could call a "horizontal" layered regulatory approach, at odds with the "vertical" silos of the Communications Act. As mentioned previously, the *Computer Inquiry* orders determined that online information services were one type of thing essentially "riding on top of" basic telecommunications services. Robert Cannon has indicated that the basic versus enhanced dichotomy "established a transformation in the conceptual framework, migrating from attempts to determine differences between technologies [Computer I] to an examination of differences between services experienced by edge users."¹⁸ Cannon indicates that the *Computer Inquiry*, though not necessarily overtly, adopted a horizontal layered model of regulation.¹⁹ Douglas Sicker writes that the *Computer Inquiry* orders "set out the original layered model; separation of the basic transport network from that of the services."²⁰ Kevin Werbach also believes that the FCC's basic/enhanced distinction can be viewed as a partial implementation of an appropriately layered approach. "The binary distinction embodied in the *Computer II* and *Computer III* decisions . . . is not sufficiently fine-grained to address the issues in today's data-centric networks, but it has proved quite resilient given the technological and competitive changes since it was first developed."²¹ Wittingly or otherwise, the notion of differentiated regulation of the horizontal layers of an electronic communications system was born.

18. Cannon, *supra* note 10, at 183.

19. *Id.* at 194-198.

20. Sicker, Further Defining a Layered Model, *supra* note 2, at 5.

21. Werbach, *A Layered Model*, *supra* note 2, at 65. At the same time, Werbach questions whether the *Computer Inquiry* orders merely added a new category of services carved out of the existing Title II rules. *See id.* As noted previously, Werbach's references to "vertical" and "horizontal" regulation in his paper essentially invert the terminology employed by the Author and other commentators and in this paper.

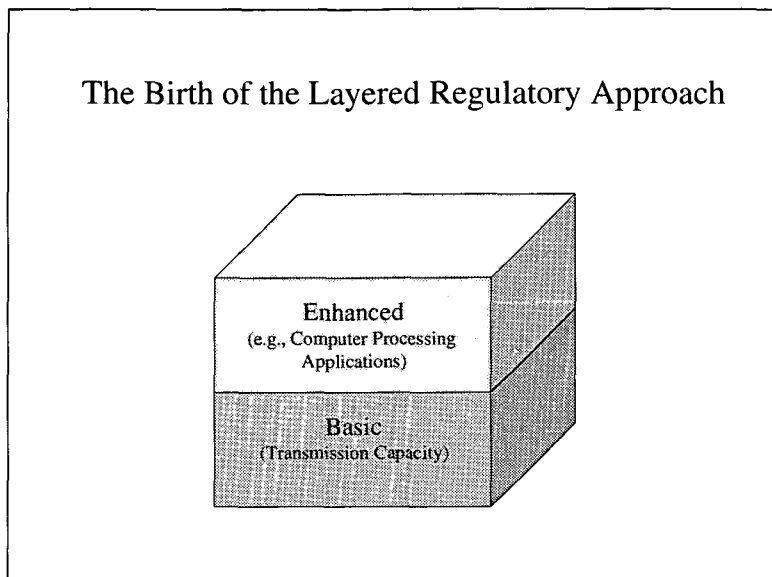


Figure 2

B. The Network Engineering Concept of Layered Architecture

Of course, even as the FCC first began looking at the definitional issues in its *Computer Inquiry* docket, the various online networks that eventually would comprise the commercial Internet were already being organized around fundamental engineering principles. Key to that organization was the concept of horizontally layered and vertically stacked network architecture, which together with application of the “end-to-end” principle have formed the basis for modern telecommunications architecture standards.²²

1. The Layering and End-to-End Principles

One significant point in the development of the modern communications network came in 1969, while the Network Working Group (“NWG”) of graduate students was working on the U.S. Department of Defense Advanced Research Project Agency (“ARPA”) network’s host-to-host communications system. Among other achievements, the group adopted the word “protocol” (then in widespread use in the medical and political fields to mean “agreed procedures”) to denote the set of rules

22. See, e.g., Werbach, *A Layered Model*, *supra* note 2, at 58 (stating that Internet architecture “is based on . . . end-to-end design and a layered protocol stack”).

created to enable communications via the ARPANET.²³ In addition, the NWG wrestled with the question of how to construct the foundational protocol in relation to application protocols. As authors Katie Hafner and Matthew Lyon described it:

Whatever structure they chose, they knew they wanted it to be as open, adaptable, and accessible to inventiveness as possible. The general view was that any protocol was a potential building block, and so the best approach was to define simple protocols, each limited in scope, with the expectation that any of them might someday be joined or modified in various unanticipated ways. The protocol design philosophy adopted by the NWG broke ground for what came to be widely accepted as the “layered” approach to protocols.²⁴

Five years later, Vint Cerf and Robert Kahn issued their seminal paper on the TCP/IP protocol suite, in which the authors “present a protocol design and philosophy that supports the sharing of resources that exist in different packet switching networks.”²⁵

Simply put, it is difficult and undesirable to write a single protocol (a set of standardized rules governing the format and conventions of data transmissions between two devices) to handle every operation in a network. As a result, engineers use multiple protocols that partition a communication problem into disparate sub-problems and organize the software into modules that handle the sub-problems. Functions are allocated to different protocol layers or levels, with standardized interfaces between layers. The flexibility offered through the layering approach allows products and services to evolve by accommodating changes made at the appropriate layer, rather than having to rework the entire set of protocols. In other words, layering allows changes to implementation of one layer without affecting others, as long as the interfaces between the layers remain

23. Additionally, in a private conversation with the Author in the fall of 2003, Vint Cerf reported that the ancient Greek root “protokollon” referred to the bit of papyrus affixed to the beginning of a scroll to describe its contents—much like the header of an Internet packet.

24. KATIE HAFNER & MATTHEW LYON, *WHERE WIZARDS STAY UP LATE: THE ORIGINS OF THE INTERNET* 147 (1996).

25. Vinton G. Cerf and Robert E. Kahn, *A Protocol for Packet Network Intercommunication*, IEEE Trans. On Comms, Com-22, No. 5 (May 1974), available at <http://cs.mills.edu/180/reading/CK74.pdf> [hereinafter Cerf/Kahn TCP Paper].

constant.²⁶ Figures 3 and 4 show the major advantage of a layered engineering approach.

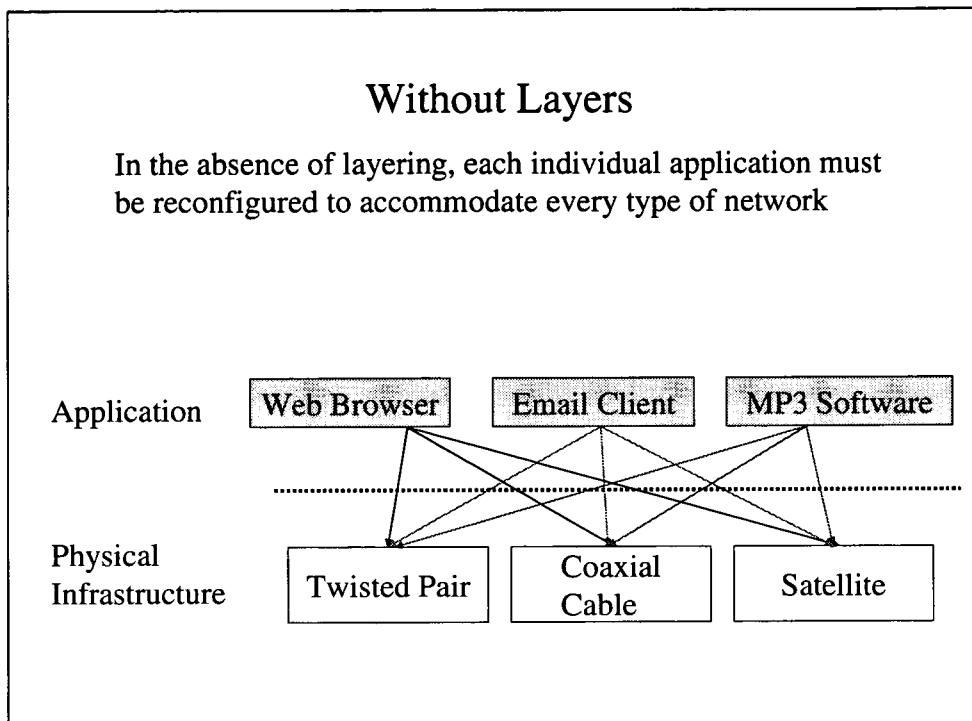


Figure 3

26. As Shah, Sicker, and Hatfield put it:

Protocol layering is a common technique to simplify networking designs by dividing them into functional layers, and assigning protocols to perform each layer's task. . . . The concept of layering relies on breaking a complex task into smaller subsets, each of which addresses a specific issue. Each layer provides a well-defined set of services to the layers above it and depends on lower layers for its own foundation.

Ashish Shah et al., *Thinking About Openness in the Telecommunications Policy Context*, Paper Presented at The Thirty-First Telecommunications Policy Research Conference 13 (Sept. 20, 2003), available at <http://intel.si.umich.edu/tprc/papers/2003/244/openness2.pdf>.

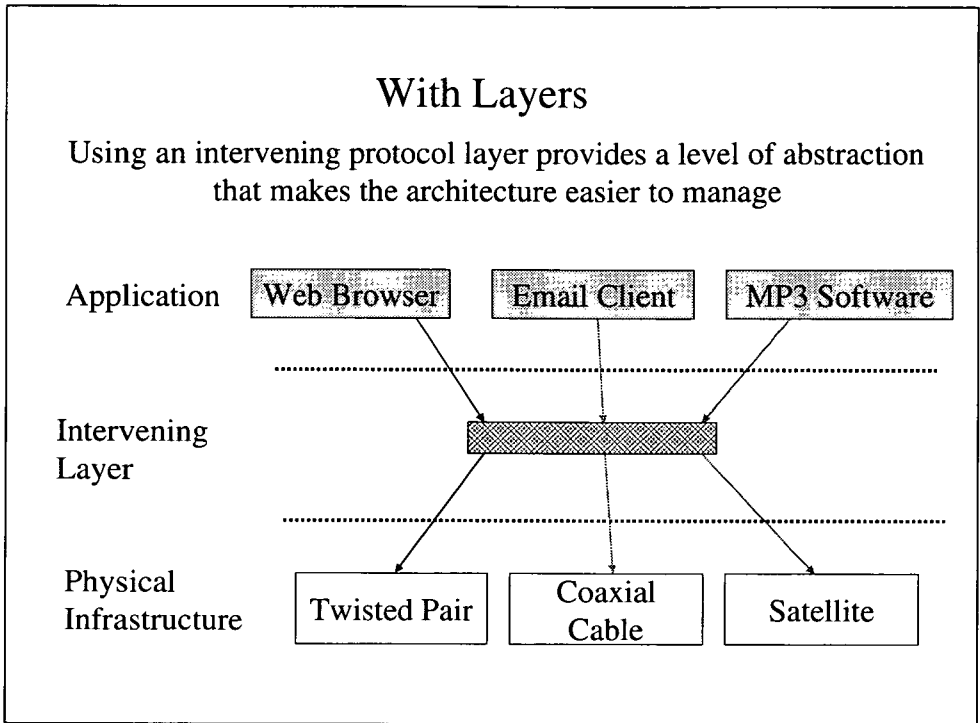


Figure 4

Given the obvious benefits of protocol layering in terms of simplifying network design and management issues, telecommunications network architectures historically have been broken into various protocol-derived layers. Almost by definition, layers create a degree of “modularity,” which allows for ease of maintenance within the network. This modularity, or independence, of each layer creates a useful level of abstraction as one moves through the layered stack. As shown above, applications or protocols at higher layers can be developed or modified with little or no impact on lower layers. This can result in tremendous efficiencies when one seeks to upgrade an existing application (higher layer) that makes extensive use of underlying physical infrastructure (lower layer). Additionally, layers facilitate communications between disparate communications networks.²⁷

Moreover, the concept of an “end-to-end” network design is closely related to, and provides substantial support for, the concept of protocol

27. See W. RICHARD STEVEN'S, *TCP/IP ILLUSTRATED: THE PROTOCOLS 4-5* (Addison-Wesley Professional Computing Series, 1994).

layering. Timothy Wu, one of the first scholars to analyze the layered approach with relation to Internet legal analysis, points out that “[t]he decision to adopt a layered network architecture does not answer the subsequent question: where exactly to place network functions within this architecture.”²⁸ By itself, the architecture is an empty shell, without specifications on how what Wu calls “the duty to code function” (the ability to delineate specific network functions) will be delegated among layers.²⁹ In essence, the end-to-end argument states that a class of functions can only be completely and correctly implemented by the applications at each end of a network communication.³⁰

As related to the Internet, the end-to-end argument is transformed into a principle “to make the basic Internet protocols simple, general, and open, leaving the power and functionality in the hands of the application.”³¹ Weiser indicates that the end-to-end network design “allows for diversity of the modes of physical access as well as a plethora of applications and content developed to work with the TCP/IP standard.”³² The resulting explosion of innovative applications on the Internet likely would never have happened but for the incorporation of the end-to-end design into the network.³³ In Wu’s words, “The Internet’s layered architecture and embedded end-to-end design have created an Internet where coding power resides among the designers of applications.”³⁴

2. Protocol Layer Models

Since the early 1970s, engineers have developed various network design models incorporating protocols in a layered manner. While sharing a common overall structure and philosophy, these protocol layers models

28. Timothy Wu, *Application-Centered Internet Analysis*, 85 VA. L. REV. 1163, 1192 (1999).

29. *Id.*

30. Clark and Blumenthal explain that the end-to-end arguments are a set of design principles concerning how application requirements should be met in a communications system. “The end-to-end arguments suggest that specific application-level functions usually cannot, and preferably should not, be built into the lower levels of the system—the core of the network.” David D. Clark & Marjory S. Blumenthal, *Rethinking the Design of the Internet: The End to End Arguments vs. the Brave New World*, Paper Submitted to the TPRC I (Aug. 8, 2000).

31. Wu, *supra* note 28, at 1164-65.

32. Weiser, *supra* note 15, at 4-5.

33. See, e.g., Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era* 14 (Stanford Law School, Working Paper No. 207) (2000), available at http://cyberlaw.stanford.edu/e2e/papers/Lemley_Lessig_e2epaper.pdf (explaining role of “e2e” design in producing the “extraordinary innovation” of the Internet).

34. Wu, *supra* note 28, at 1193.

have been organized in somewhat different ways to serve different purposes. Two models in particular stand out.

The justly famous "Internet Protocol Suite", introduced in 1974,³⁵ involves multiple layers riding on separate physical infrastructure. The IP Suite has become the de facto name for a family of over 100 data communications protocols used to organize computer and data communications equipment into practical computer networks. It has been noted that there is no standard, universally accepted way to describe the relevant layers of Internet architecture.³⁶ Figure 5 shows one typical four-layer schematic.

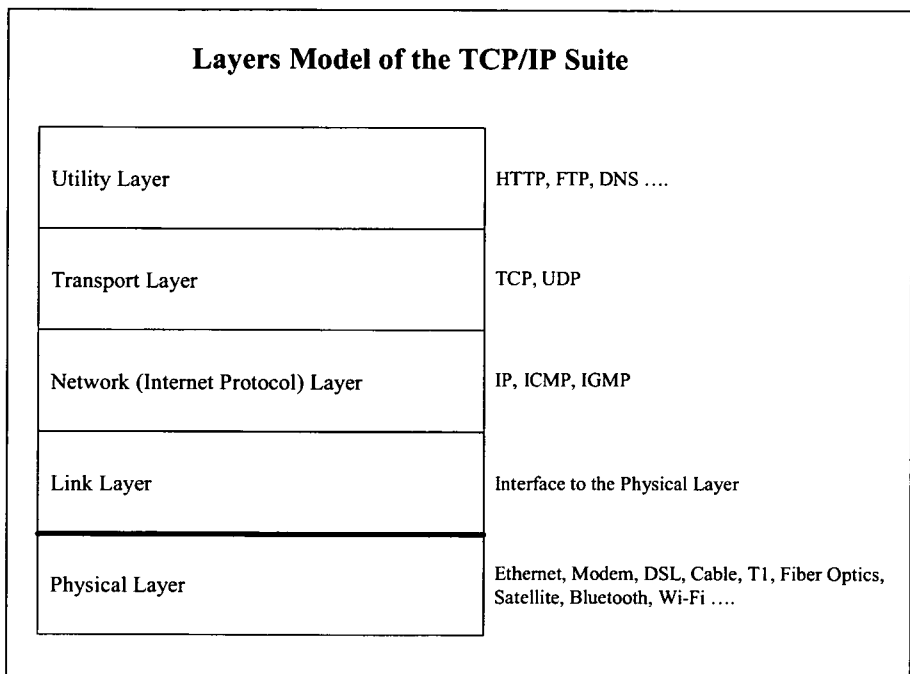


Figure 5

35. See generally, Cerf/Kahn TCP Paper, *supra* note 25.

36. See, e.g., CRAIG HUNT, TCP/IP NETWORK ADMINISTRATION 8 (1992) (explaining that with no universal agreement about how to describe the layers of the TCP/IP model, it is generally viewed as composed of fewer than seven layers); LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE 101 (1999) [hereinafter LESSIG, CODE AND OTHER LAWS] (citation omitted) (explaining that most descriptions of the TCP/IP suite define three to five functional layers); Shah et al., *supra* note 26, at 15 (explaining that the TCP/IP protocols map to a four-layer conceptual model).

Notably, the data received from the applications at the upper layers is broken up into data packets to be handed to the TCP/IP layers; conversely, the data packets received from the TCP/IP layers are assembled into a data stream to be delivered to the upper layers. In the encapsulation of data, lower layers treat data passed from upper layers as structureless pure data ("payload"), and place headers and/or trailers around the payload. Several authors explain that:

The Internet protocols are arranged in essentially independent, unbundled layers with the Internet Protocol itself at the "waist" of the stack. The protocol stack broadens above the waist to support a wide range of transport and application layers including email, the World Wide Web, file transfer protocols, remote login, etc. The protocol stack broadens below the waist to ride on a wide range of underlying networks using a variety of technologies including frame relay, ATM, ADSL, fiber optic systems, and so on. Modularity promotes fair and open competition between and among providers of the different layers by allowing competitors to compete with products that will interoperate. The modularity/stratification coupled with openness facilitates the introduction of new transmission technologies and new applications thereby stimulating innovation.³⁷

Another example of a protocol layers model is the "Open System Interconnection ('OSI') Reference Model," which was first developed in 1978 by the International Organization for Standardization ("ISO") and provided a conceptual basis for international protocol development and implementation.³⁸ The OSI Model includes seven embedded layers:

- (1) Application Layer: Semantics—includes application programs such as electronic mail;
- (2) Presentation Layer: Syntax—includes functions for basic encoding rules;
- (3) Session Layer: Dialog Coordination—handles application functionalities;
- (4) Transport Layer: Reliable Data Transfer—breaks data into packets for transport;
- (5) Network Layer: Routing and Relaying—handles network flow of data packets;
- (6) Data Link Layer: Technology-Specific Transfer—interfaces with physical layer; and
- (7) Physical Layer: Physical Connections—specifies electrical/ photonic characteristics.

37. Shah et al., *supra* note 26, at 13.

38. See JOHN D. SPRAGINS ET AL., TELECOMMUNICATIONS PROTOCOLS AND DESIGN 14-15, 118-27 (1991).

Like the TCP/IP Suite, the OSI Model is layered to segment discrete functional responsibilities. Each layer represents a function performed when data is transferred between cooperating applications across the network. In the resulting vertical hierarchy, the content begins at the top layer and works down to the lower physical layer for transport to the ultimate destination, where it then ascends back to the top layer again.³⁹

From these two standardized industry models (of which the TCP/IP Suite has achieved much more universal acceptance and prominence),⁴⁰ others have attempted to glean a common model that incorporates the key functions of the different layers.⁴¹ One of the more recent layering models has been suggested by Professor Yochai Benkler of New York University, whom Lawrence Lessig has described as “perhaps the best communications theorist of our generation.”⁴² The “Benkler Communications System Layers Model” incorporates the TCP/IP Suite as part of three distinct layers: the physical infrastructure, the logical/code/applications layer, and the content layer.⁴³ Figure 6 shows how these three layers of the Benkler model relate to one another.

39. According to Shah,

Various principles were applied to arrive at the seven layers. . . .

- A layer should be created where a different level of abstraction is needed.
- Each layer should perform a well-defined function.
- [. . .]
- The layer boundaries should be chosen to minimize the information flow across the interfaces.
- The number of layers should be large enough that distinct functions need not be thrown together in the same layer out of necessity, and small enough that the architecture does not become unwieldy.

Shah et al., *supra* note 26, at 9 (citation omitted).

40. Werbach, *A Layered Model*, *supra* note 2, at 59 n.87 (explaining that TCP/IP, not OSI, has become the dominant protocols model).

41. See, e.g., NRENAISSANCE COMM., NAT’L RESEARCH COUNCIL, *REALIZING THE INFORMATION FUTURE: THE INTERNET AND BEYOND* 47-51 (1994) (proposing an “open data network architecture,” with Network Technology Substrate, ODN Bearer Service, Transportation Services and Representation Standards, Middleware Services, and Applications layers).

42. LAWRENCE LESSIG, *THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD* 23 (2001) [hereinafter LESSIG, *THE FUTURE OF IDEAS*].

43. Yochai Benkler, *From Consumers to Users: Shifting the Deeper Structures of Regulation Toward Sustainable Commons and User Access*, 52 *FED. COMM. L.J.* 561, 562 (2000).

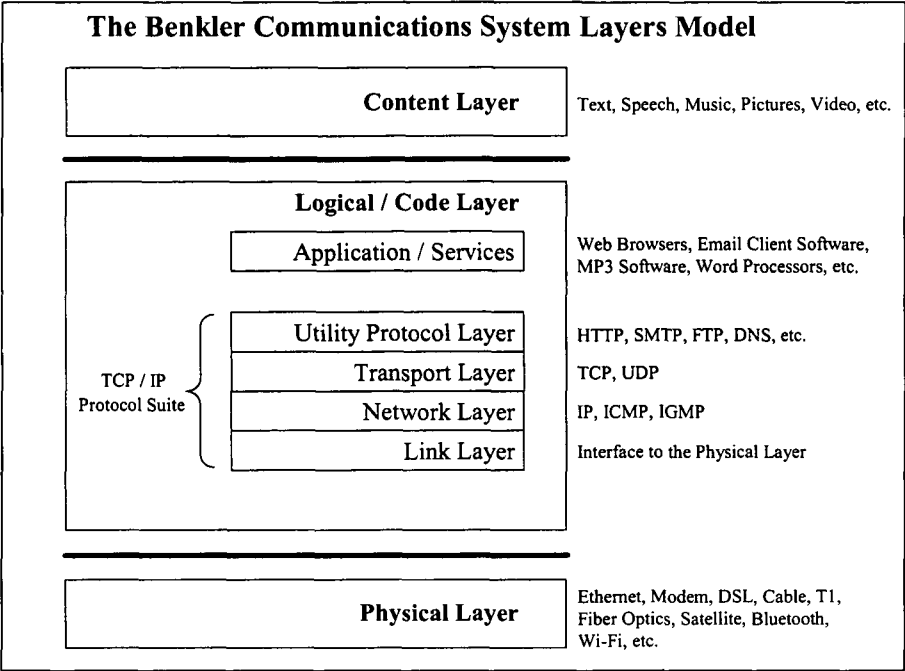


Figure 6⁴⁴

In all of these engineering-based models, the fundamental point is that the horizontal layers, defined by code or software, serve as the functional components of an end-to-end communications system.⁴⁵ Each layer operates on its own terms, with its own unique rules and constraints, and interfaces with other layers in carefully defined ways.

44. Solum & Chung, *supra* note 1, at 28.

45. It must be noted that these various models are somewhat oversimplified for cases where IP overlays Frame Relay, Asynchronous Transfer Mode (“ATM”), Multi Protocol Label Switching (“MPLS”), and other types of networks.

C. *The Internet Era: Legal Walls Stay Up as Logical Walls Come Down*

1. The Communications World

As the 1990s unfolded, political interest in adopting a modern telecommunications law increased. In 1994, while the outline of a new federal statute was beginning to take shape in Congress, the Clinton Administration proposed adding another title to the Communications Act. Title VII would have established a new overarching regulatory paradigm governing all “two-way, broadband, interactive, switched, digital transmission services,” regardless of the underlying technology.⁴⁶ Some subsequently have labeled the Title VII initiative “tremendously ambitious,”⁴⁷ while others see it as merely another example of “incremental adaptation of past rules.”⁴⁸ With concerted industry opposition, however, the end result was a stalled effort on the Title VII approach,⁴⁹ and eventual adoption two years later of the Telecommunications Act.

The Telecommunications Act of 1996, while largely sticking to the legacy regulatory “silo” regime, took a small step towards the horizontally layered engineering world in several respects. Most importantly, the 1996 Act largely adopted the basic/enhanced services split, in the guise of “telecommunications service” and “information service,”⁵⁰ thereby affirming the rich legacy of the *Computer Inquiry* decisions. In addition, new Section 706 (adopted only as a footnote to the U.S. Code, and not as a separate title unto itself) focused on “encourag[ing] the deployment” of

46. THE WHITE HOUSE, ADMINISTRATION WHITE PAPER ON COMMUNICATIONS ACT REFORMS (1994), available at <http://www.ibiblio.org/pub/academic/political-science/internet-related/NII-white-paper>.

47. Nakahata, *supra* note 3, at 129.

48. Bar & Sandvig, *supra* note 2, at 2. Indeed, the authors criticize both the FCC’s *Computer Inquiry* rules and the failed Title VII proposal as inherently flawed. They argue that both approaches to the crisis of convergence—fitting new communication services into existing categories (the *Computer Inquiries*) and establishing new categories for new services (the ill-fated Title VII approach in 1994)—suffer from the same shortcomings of proposing “marginal adjustments to a system anchored in particular technological implementations of communications services, rather than starting from any fundamental purpose of communication policy.” *Id.* at 19.

49. As Bar and Sandvig report, “the attempt was quickly killed by telcos and cable operators who feared losing the advantages each saw in the established regimes.” Bar & Sandvig, *supra* note 2, at 2 n.3. See also Nakahata, *supra* note 3, at 129 (the Title VII proposal “had something for everyone to hate”).

50. 47 U.S.C. § 153(46), (20) (2003); Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, *First Report and Order and Further Notice of Proposed Rulemaking*, 11 F.C.C.R. 21905, paras. 102-105, 5 Comm. Reg. 2nd 696 (1996) [hereinafter *Non-Accounting Safeguards Order*].

what Congress called “advanced telecommunications capability.”⁵¹ This capability supports a panoply of “voice, data, graphics, and video telecommunications,” but “using any technology” and “without regard to any transmission media or technology.”⁵² The apparent separation between the wide range of services and applications, and the agnostic physical networks involved, appears to be informed in part by the brief legislative battle over the Title VII proposal.

In a slightly different bent, Section 251 of the 1996 Act created a new network unbundling regime that focuses both on the physical infrastructure that comprises monopoly local exchange networks (local loops, local switches, transport facilities), and all the vertical capabilities that come with those Unbundled Network Elements (“UNEs”).⁵³ Under Section 271 of the 1996 Act, the Bell Operating Companies (“BOCs”) are allowed to provide a previously-barred category of services (voice and data in-region long-distance service) in exchange for allowing competitors to access and utilize underlying local network functionalities.⁵⁴

Despite these uncharacteristic variations, however, the 1996 Act largely retained the preexisting vertical legal walls separating various services and applications/networks from each other.⁵⁵ A recent report by the National Research Council opines that the 1996 Act for the most part “assumes the continued existence of a number of distinct services that run over distinct communications technologies and separate infrastructure,” and thus “does not fully reflect the converged nature of broadband (different communications infrastructure are able to deliver a similar set of services using a common platform, the Internet).”⁵⁶ As attorney John Nakahata puts it, “the 1996 Act only started the work of reforming our

51. 47 U.S.C. § 157 (2003).

52. *Id.*

53. 47 U.S.C. § 251 (2003). Werbach reports that the 1996 Act’s unbundling regime was founded on the FCC’s earlier concept of Open Network Architecture (“ONA”), intended originally as a form of modular network unbundling to benefit enhanced service providers. Werbach, *A Layered Model*, *supra* note 2, at 61.

54. 47 U.S.C. § 271 (2003).

55. See Werbach, *A Layered Model*, *supra* note 2, at 42 (explaining that the Telecommunications Act of 1996 retained the silo model of communications policy); Weiser, *supra* note 15, at 11 (explaining that the 1996 Act “did not disturb a category-based regulatory strategy”).

56. COMM. ON BROADBAND LAST MILE TECH., NAT’L RESEARCH COUNCIL, BROADBAND: BRINGING HOME THE BITS 32 (2002), available at <http://books.nap.edu/books/0309082730/html/index.html>.

communications laws to truly harmonize the diversity of regulation among information platforms.”⁵⁷

Meanwhile, the FCC continues to retain its basic/enhanced dichotomy and fundamental nondiscriminatory unbundling requirement through the various *Computer Inquiry* proceedings. Even when the Commission replaced the BOCs’ structural separation requirements with nonstructural safeguards, it affirmed and strengthened the requirement that the BOCs acquire transmission capacity for their own enhanced services operations under the same tariffed terms and conditions as competitive ESPs.⁵⁸ Following passage of the Telecommunications Act, the FCC found that the preexisting *Computer Inquiry* requirements are consistent with the statute, and continue to govern BOC provision of information services.⁵⁹ The Commission explained that the *Computer Inquiry*-based rules are “the only regulatory means by which certain independent ISPs are guaranteed nondiscriminatory access to BOC local exchange services used in the provision of intraLATA information services.”⁶⁰

In a 1998 report to Congress on universal service, the FCC summarized its regulatory philosophy (apparently informed by layers thinking) in this regard:

Communications networks function as overlapping layers, with multiple providers often leveraging a common infrastructure. As long as the underlying market for provision of transmission facilities is competitive or is subject to sufficient pro-competitive safeguards, we see no need to regulate the enhanced functionalities that can be built on top of those facilities. . . . As an empirical matter, the level of competition, innovation, investment, and growth in the enhanced services industry over the past two decades provides a strong endorsement for such an approach.”⁶¹

57. Nakahata, *supra* note 3, at 97. As will be discussed *infra* Part III.E, in contrast the European Union had adopted a comprehensive regulatory framework that encompasses a technology-neutral model relying in part on the horizontal network layers concept.

58. Policy and Rules Concerning the Interstate, Interexchange Marketplace, Implementation of Section 254(g) of the Communications Act of 1934, as amended, *Report and Order*, 16 F.C.C.R. 7418, para. 4, 23 Comm. Reg. (P & F) 641 (2001) [hereinafter *CPE/Enhanced Services Bundling Order*]; see Cannon, *supra* note 13, at 200.

59. *Non-Accounting Safeguards Order*, *supra* note 50, paras. 132, 135, 136.

60. *Id.* para. 134

61. *Federal-State Joint Board on Universal Service*, Report to Congress, 11 F.C.C.R. 11501, para. 95, 11 Comm. Reg.2nd 1339 (1998) [hereinafter *FCC Report to Congress*]. The FCC also has acknowledged that the Internet is a “global information system [that] provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure” *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facils., Declaratory Ruling and Notice of Proposed Rulemaking*, 17 F.C.C.R. 4798, para. 1 n.1 (2002).

In 2001, the FCC emphasized the continued retention of the “fundamental provisions” contained in the *Computer Inquiry* decisions “that facilities-based carriers continue to offer the underlying transmission service on nondiscriminatory terms, and that competitive enhanced services providers should therefore continue to have access to this critical input.”⁶² In particular, the Commission stressed, “the separate availability of the transmission service is fundamental to ensuring that dominant carriers cannot discriminate against customers who do not purchase all the components of a bundle from the carriers, themselves.”⁶³ Thus, the FCC repeatedly and forcefully has acknowledged the “fundamental provisions” of the *Computer Inquiry* decisions that protect an ESP’s ability to access lower level transmission services as a “critical input.” As will be seen below, that position is now under severe challenge by the very same agency that originally promulgated and defended it.⁶⁴

2. The Internet World

Meanwhile, on the supposedly unregulated Internet side of the basic/enhanced services divide, vertically-inclined legal precedent was being established by Congress, the courts, and the states. Since the rise of the commercial Internet in the early 1990s, ISPs have found themselves being held legally responsible for the actions of third parties utilizing their networks. Under this new concept of “ISP liability,” providers of wholesale and retail network connectivity are deemed responsible for the content exchanged and applications provided by end-user customers and unaffiliated third parties.

Congress first addressed the issue squarely in the Digital Millennium Copyright Act (“DMCA”) of 1998, where ISPs were granted limited legal immunity in exchange for removing infringing material that resides on their networks once an appropriate notice is received from the copyright holder or its legitimate agent. This regime, commonly referred to as a “notice and takedown” requirement, seeks to balance the interests of the ISPs as information conduits, while protecting the owners of copyrighted material from continual infringement. The DMCA further attempts to balance competing interests by giving the alleged infringers an opportunity to challenge the claim of the assumed copyright holder.⁶⁵

62. *CPE/Enhanced Services Bundling Order*, *supra* note 58, para. 12.

63. *Id.* para. 44 (footnote omitted).

64. *See infra* Part III.B.2.b.

65. 17 U.S.C. § 512 (2003).

Since enactment of the DMCA, however, ISPs increasingly have been under legal, financial, and political pressure to account for the actions of users of the Internet over whom they have little or no control.⁶⁶ Some recent examples include: (1) the Recording Industry Association of America's ("RIAA") efforts to obtain private customer information from Verizon, without an appropriate judicial subpoena to track down supposed users of peer-to-peer networks; (2) demands from the Attorney General of Pennsylvania for ISPs to block access to users throughout North America to numerous websites, including countless legitimate ones, so that a site allegedly involving child pornography would not be accessible by residents of Pennsylvania; and (3) a French court's holding that a U.S.-based ISP is legally liable under French law for third parties selling Nazi memorabilia via its website.⁶⁷

III. A NEW CONCEPT: REGULATION ALONG HORIZONTAL NETWORK LAYERS

The concept of separating out that which needs to be regulated, and that which needs little or no regulation, is a sound one. In the Author's view, the fundamental organizing principles themselves must be reexamined in light of the coming IP-centric world. Kevin Werbach insists that the nation's communications policies need to be reformulated with the Internet at the center, because communications policy inevitably will become a mere subset of Internet policy.⁶⁸ Of course, even if it were not premised on the engineering protocols established by the TCP/IP suite, the layering concept would have considerable relevance with regard to any kind of electronic communications network.⁶⁹ Nonetheless, given the self-evident dynamics of digital transformation and a networked world,⁷⁰ and the market reality of companies and individuals converging to common IP platforms, the discussion below is focused on drawing public policy lessons from Internet topology and experience.

66. For a detailed account of this subject, see generally TIMOTHY D. CASEY, *ISP LIABILITY SURVIVAL GUIDE: STRATEGIES FOR MANAGING COPYRIGHT, SPAM, CACHE, AND PRIVACY REGULATIONS* xix (2000) (a practical guide for "understanding, complying, or otherwise dealing with existing and ongoing efforts to control or regulate the Internet").

67. See *infra* Part III.A. for a further discussion of these and other recent examples.

68. Werbach, *A Layered Model*, *supra* note 2, at 38, 46.

69. Indeed, as Craig McTaggart reminds us, "[t]elephone and Internet traffic are often carried over the same physical wires and cables. They are simply encoded using different technical protocols at the logical layer." Craig McTaggart, *A Layered Approach to Internet Legal Analysis* 5 (Dec. 21, 2002) (unpublished article), available at <http://www.innovationlaw.org/cm/ilg2002/reading/layered1.pdf>.

70. Weiser, *supra* note 15, at 10 (explaining that there are two fundamental dynamics of the Information Age—digital transformation and a networked world).

A. *Sketching the Layers Framework*

Given the growing number of complex legal problems that have developed concerning IP-based networks, services, and applications, it is not surprising that a small but well-respected cadre of academics and expert analysts has begun suggesting the creation of a new legal regime. This approach is informed by the horizontal protocol layers first formulated by network engineers over thirty years ago, as well as the partial layered regulatory scheme adopted by the FCC in its *Computer Inquiry* decisions. This Part briefly discusses many of the major problems with the current legal system, weighs the pros and cons of a layered framework, and suggests the outline of a new layered model.

1. Why Adopt a Layers Approach?

Initially, commentators have pointed out some of the obvious intrinsic flaws in the current U.S. “silos”-based legal and regulatory regime. Kevin Werbach puts it succinctly when he observes that the basic problem is that “[t]he hermetically-sealed categories at the core of the [vertical] approach are foreign to the Internet.”⁷¹ More precisely, he identifies four fundamental problems with the current regulatory approach: it assumes distinctions between individual services are clear (in the IP world any network can carry virtually any kind of traffic); it applies most rules in an all-or-nothing fashion (many IP services bear indicia of more than one regulatory category); it looks at each service category in isolation (increasingly all networks are interconnected, and the critical policy issues concern the terms of such interconnection); and it concentrates on the services ultimately provided to end users (competitive dynamics are increasingly driven by behind-the-scenes network architectures).⁷²

Douglas Sicker finds no fewer than nine separate problems created by the current legal and regulatory regime when applied to the IP world, including: (1) interconnection distortions (ISPs have no carrier rights to interconnect with ILECs); (2) universal service concerns (current model conflates the network with the applications); (3) bundling discriminations (certain players can restrict access to content); (4) content discrimination (certain players can dictate the terms of content and conduit delivery); (5) accessibility concerns (only traditional voice service providers are obligated to facilitate accessibility for individuals with disabilities); (6) security concerns (wiretapping applies only to traditional voice services); (7) safety concerns (only certain players are required to support emergency

71. Werbach, *A Layered Model*, *supra* note 2, at 47.

72. *Id.* at 58.

service); (8) market distortion (price does not reflect cost of service); and (9) investment and deployment distortion (providers make investment choices based on policy).⁷³

Rob Frieden adds that U.S. telecommunications law and policy historically has been “based on fixed service definitions and relatively static assumptions about the industrial organization of telecommunications and information processing.”⁷⁴ Technological innovations and industry developments jeopardize the non-convergent “Old World Order” dichotomies.⁷⁵

On the flip-side, commentators over the past several years have presented compelling arguments in favor of the wholesale adoption of a public policy paradigm that relies on the network layers model. In general terms, as Canadian Craig McTaggart indicates, “The analysis of Internet legal issues can be aided by an understanding of the Internet’s unique layered architecture.”⁷⁶ Robert Entman summed up the consensus at the Aspen Institute Conference on Telecommunications Policy in August 2000 with the observation that “conceptually distinguishing the technical layers of the system offers a new paradigm that can clarify regulatory problems and point to their solutions.”⁷⁷ Sicker offers that the model “does not necessarily provide the policy answers, but it provides a framework for better resolving policy issues.”⁷⁸

Entman goes on to explain that the power of making conceptual layers distinctions lies in the insights they generate about public policy towards telecommunications. In particular, (1) applications should be separated conceptually from transport and from content; (2) higher degrees of competition may be more feasible and desirable at some layers than others, so that encouraging robust competition at the applications level may yield more consumer benefits than trying to stimulate multiple competitive transport networks; and (3) policymakers can choose their battles more

73. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 6-8.

74. Rob Frieden, *Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach*, 55 FED. COMM. L.J. 207, 209 (2003).

75. *Id.*; see also Bar & Sandvig, *supra* note 2, at 17 (“[A] single infrastructure, the [I]nternet, now offers the range of applications that once existed in distinct domains, governed by different policies reflecting different compromises between control and access. In addition, the Internet also brings about new applications that defy classification . . .”).

76. McTaggart, *supra* note 69, at 1.

77. ROBERT M. ENTMAN, *TRANSITION TO AN IP ENVIRONMENT: A REPORT OF THE FIFTEENTH ANNUAL ASPEN INSTITUTE CONFERENCE ON TELECOMMUNICATIONS POLICY 1* (2001), available at <http://www.ciaonet.org/wps/enr04/enr04.pdf>.

78. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 9.

selectively, targeting those points in the layers where promoting competitiveness will yield the most efficient result.⁷⁹

Kevin Werbach makes four points about the benefits of what he calls the vertical (and others call the horizontal) approach. Such an approach: (1) removes the assumption that service boundaries are clear and are tied to physical network boundaries; (2) implies a more granular analysis within each layer; (3) brings to the forefront the issue of interconnection between networks and between functional layers within those networks; and (4) recognizes the significance of network architecture as a determining factor in shaping business dynamics.⁸⁰ As a result, he calls for regulation to track the architectural model of the Internet itself, both its end-to-end nature and its layered protocol stack.⁸¹

Robert Cannon explains how a proper application of layering concepts yields a number of important public policy benefits:

[D]iffering layers demarcate natural boundaries between markets. These market boundaries permit communications regulation, where necessary, to be particularly successful. By conceptualizing the policy as layers, the analyst is capable of grouping and segregating issues. Issues related to the physical network layer (i.e., common carrier regulation, spectrum policy, cable franchises) are different from those of the logical layer (i.e., open access, peering) and are different from those in the content layer (i.e., intellectual property, gambling, taxation, libel). Thus, by conceptualizing the policy as layers, the analyst is enabled to identify markets, clarify issues, create boundary regulations that are effective, and, in so doing, target solutions where issues reside without interfering with other industries and opportunities. The Layered Model is a market policy mapped onto a technical conception.⁸²

Sicker observes that dividing the model horizontally allows us to “separate service aspects of the network in a manner consistent with the design of [the] network.”⁸³ The real value is that “regulation can be minimized or compartmentalized by considering the role of regulation on each layer distinct from the layer above or below it.”⁸⁴ Frieden believes that “a horizontal orientation would trigger a substantial revamping of regulatory treatment as it would possibly free some ventures that have historically operated under extensive regulation, even as it imposes new

79. ENTMAN, *supra* note 77, at 2-3.

80. Werbach, *A Layered Model*, *supra* note 2, at 67.

81. *Id.*

82. Cannon, *supra* note 13, at 195.

83. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 9.

84. *Id.*

regulatory burdens on ventures historically exempt from regulation.”⁸⁵ Such a horizontal orientation also “would establish a regulatory regime based on how technologies function and would foreclose the need to make semantic distinctions between such converging concepts as telecommunications used in the provision of information services and telecommunications services provided directly to users.”⁸⁶

Commentators focus in particular on the valuable ways that a layered approach can help uncover and deal with market power issues. Sicker states, for example, that providers at the lower layer should be “regulated differently from [each other], not on the basis of network type, but rather on the basis of market power.”⁸⁷ Entman reports that participants at the Aspen Institute’s 2000 telecommunications conference found the use of the four-layer framework “an invaluable tool for crafting more calibrated pro-competition policies.”⁸⁸ In particular, the multi-layered approach allows policymakers to shift their focus, which traditionally is on regulation of the voice application, to regulation of transport. The primary public policy goal is to encourage efficiency in innovation, by ensuring a lack of artificial barriers to entry of innovative technologies and services. Competition itself is not a policy goal, Entman states, but rather merely a means to stimulate and direct market forces that help attain the primary goals. Recognizing the distinctions among layers will help achieve optimal levels of competition. “Each layer needs to be analyzed separately in terms of bottlenecks that exist or might arise to stymie competition,” given the fact that each layer has different economies of scale, and economies of scope may cross layers.⁸⁹

As with any analytical tool, the layers principle is not without its drawbacks. To date, however, most of the concerns raised in the academic literature come from otherwise committed supporters of the principle, and go more to process and political issues than to any significant substantive reservations. Lingering ambiguities include: (1) developing the optimal way to translate valuable insights into concrete and effective policy rules,⁹⁰ (2) devising empirically based tests for market power and monopoly abuses, (3) establishing tough enforcement mechanisms to minimize delays and “gaming of the process,”⁹¹ (4) defining and implementing a realistic

85. Frieden, *supra* note 74, at 213-214.

86. Frieden, *supra* note 74, at 214.

87. Sicker, Further Defining a Layered Model, *supra* note 2, at 9.

88. Entman, *supra* note 77, at 6.

89. *Id.* at 13-14.

90. *Id.* at 15.

91. *Id.*; see also Michael J. Weisman, The Regulation of a Layered Regulatory

transition strategy to a comprehensive new framework,⁹² and (5) determining how to grant policymakers broad authority to make the necessary comprehensive statutory and regulatory changes.⁹³ While challenging and deserving of careful attention, none of these concerns appears insurmountable.

Another potential drawback, in the Author's view, centers on the possibility that a layers-informed legal framework could be transformed by some into a rigid and inflexible mandate. At its core, the layers principle is a pragmatic tool, based on a close analysis of technological and marketplace realities. In adopting, applying, and enforcing a layers-based approach, policymakers should take care not to enshrine it as either definitive or dispositive in each and every situation.

A more straightforward objection is a political one, namely that a layered approach is simply too extreme a change to garner the political support to make the necessary legal and regulatory revisions. For example, John Nakahata, otherwise a proponent of the concept, opines that from an institutional perspective a "'bottoms-up' statutory overhaul" focused on a functional layers approach is "a fundamental, radical change."⁹⁴ The layered approach, however, has been shown not to be that different in concept from the FCC's basic/enhanced distinction, or the impetus behind the failed Title VII regime. Douglas Sicker insists that "[o]ne of the strongest motivations for moving toward the proposed framework is that there exists significant precedence. It is not a radical departure from the basic regulatory structure and precedent of the last four decades."⁹⁵ Thus, it appears that the layered model is not such a novel concept after all, but rather a refinement and extension of the FCC's preexisting basic/enhanced dichotomy.

Approach to E-Mail, Internet Radio and IP Telephony 30 (Mar. 2002) (unpublished essay submitted to Professor Toshiko Takanaka, University of Washington School of Law) (stating that changes proposed by advocates of the layered model "would only be possible in an atmosphere of aggressive antitrust enforcement"), available at <http://www.law.washington.edu/Casrip/classes/Layeredregulationpaper.pdf>.

92. Werbach, *A Layered Model*, *supra* note 2, at 54-64; Douglas C. Sicker & Joshua L. Mindel, *Refinements of a Layered Model for Telecommunications Policy*, 1 J. ON TELECOMMS. & HIGH TECH. L. 69, 71, 85, 92-93.

93. See J. Scott Marcus, *The Potential Relevance to the United States of the European Union's Newly Adopted Regulatory Framework for Telecommunications*, at 28 (FCC, OPP Working Paper Series No. 36) (2002); Nakahata, *supra* note 3, at 97; Frieden, *supra* note 74, at 249.

94. Nakahata, *supra* note 3, at 130.

95. Douglas C. Sicker, *Applying a Layered Policy Model to IP Based Voice Services*, IEEE COMPUTER SOC'Y, PROCS. OF THE 36TH HAWAII INT'L CONF. ON SYSTEMS SCIENCES (HICSS '03), at 8 (2002) [hereinafter Sicker, *Layered Policy Model*].

Moreover, several farsighted regulators already have acknowledged the compelling need for a new regulatory paradigm that reflects the reality of the IP world. In recent months, FCC Chairman Michael K. Powell has expressed the desire to embrace "Internet-premised, Internet-based IP type communications" and "tailor a set of regulatory clothing uniquely for it."⁹⁶ More explicitly, Chairman Powell discusses the need to "build from a blank slate up as opposed to from the myriad of telecommunications regulations down," so that one can "make each regulatory judgment as the consequence of forethought and judgment and understanding about this specific technology."⁹⁷ In contrast, he notes, "there is no clear answer in the statute, the statute is in its little buckets, and the buckets don't make sense."⁹⁸ Elsewhere, Chairman Powell again invokes the imperative to "establish a rational policy environment for IP-based services to continue to evolve," informed by "the recognition that the Internet is inherently a global network that does not acknowledge narrow, artificial boundaries."⁹⁹

Robert Pepper, Chief of Policy Development at the FCC, explained in a recent interview how the network layered concept represents a different approach in Washington, D.C., but one that may only require some further education of policymakers:

We're seeing a significant shift in the telecom industry's underlying technology as we move from circuits to packets and from a traditional architecture to one where all forms of traffic ultimately ride over IP. . . . Now, there are people in Washington who don't understand a great deal about the technology or even the concept of the layered approach to communications networks and services. The idea that you could have a transport link that is independent of sound or analog waves is new to them. . . . It's a completely different way of thinking about our networks. In many respects it all really comes down to an issue of educating people.¹⁰⁰

96. Remarks of Michael K. Powell, Chairman, FCC, at the Meeting of the Technology Advisory Council 1 (Oct. 20, 2003), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-241750A1.pdf.

97. *Id.* at 2.

98. *Id.*

99. Remarks of Michael K. Powell, Chairman, FCC, at the FCC Forum on Voice over Internet Protocol (VoIP) 1 (Dec. 1, 2003), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-241775A1.pdf; see also Statement of Chairman Michael K. Powell, IP-Enabled Servs., *Notice of Proposed Rulemaking*, WC Docket No. 04-36 (Mar. 10, 2004) at 2, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-28A1.pdf [hereinafter *IP-Enabled Services NPRM*] ("[W]e simply cannot contort the character of the Internet to suit our familiar notions of regulation. We will not dumb down the genius of the [W]eb to match the limited vision of a regulator.").

100. Jeff Pulver, *VON Pioneers: Robert Pepper of the FCC*, VON MAGAZINE, Nov.-Dec. 2003, at 13-14.

Some leading regulators have publicly advocated adoption of a layers model. As one example, Brett Perlman, then-Commissioner of the Public Utility Commission of Texas, told FCC Commissioner Kevin Martin in January 2003 that the FCC could meet its goals of encouraging broadband competition and network investment “if it were to apply a ‘layered model’ to broadband infrastructure.”¹⁰¹ Commissioner Perlman went on to note that the layered model “has been discussed in several recent legal and technical articles and is consistent with the underlying protocols governing the Internet.”¹⁰²

Thus, while the political, institutional, and educational challenges cannot be underestimated, the layers model represents a shift in thinking that successfully mirrors the way that networks and markets actually operate. Adoption of a layering framework would be a logical extension of recent technology and policy insights to the broader areas of telecommunications and Internet law.¹⁰³

2. What Kind of Layers Model to Adopt?

While there are obvious commonalities among them, different layers models have been proposed by a number of commentators. A natural starting point is determining exactly how many layers to identify and include in a conceptual model. Many see a logical grouping of four different protocol layers.¹⁰⁴ In particular, Entman indicates that for purposes of public policy, it might suffice to distinguish four layers: content, applications, network, and data link. Content describes the actual information transmitted (e.g., voice conversation, e-commerce transactions, video streams). Applications denotes the nature of the service provided (e.g., voice, video). Data links, also called interconnection points, are used for routing protocols and packet structure, fiber, copper, and coaxial

101. Letter from Brett Perlman, Commissioner, Pub. Util. Comm’n of Texas, to The Honorable Kevin Martin, Commissioner, FCC 3-4 (Jan. 28, 2003) (on file with the Journal).

102. *Id.* at 4 (footnote omitted). After discussing the model in some detail, Perlman observes that application of the model would allow regulation based on a “market power” test, not on types of networks or services, so that network access and unbundling requirements would apply to any broadband provider with market power. *Id.*

103. Sicker, Further Defining a Layered Model, *supra* note 2, at 12.

104. See, e.g., TIM BERNERS-LEE, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR 129-30 (1999) (describing four horizontal layers in the Web’s infrastructure: “the transmission medium, the computer hardware, the software, and the content”); LESSIG, CODE AND OTHER LAWS, *supra* note 36, at 101 (discussing four layers: applications, transport, network, and data-link, with content layer included in what others call the application layer); Werbach, *A Layered Model*, *supra* note 2, at 59 (using a four layers model: content, applications or services, logical infrastructure, physical infrastructure).

cable.¹⁰⁵ McTaggart also finds four readily separable layers: content/transaction layer, application layer, logical layer, and physical layer.¹⁰⁶ Others see only three layers necessary for a viable model.¹⁰⁷ Sicker concludes that the generalized horizontal policy model has either three or four layers: applications, transport, access, and an optional content layer.¹⁰⁸ Still others go up to six layers,¹⁰⁹ or even seven.¹¹⁰ Finally, some have suggested a two-layered approach, which creates two broad categories of facilities and infrastructure versus applications and services.

As Sicker aptly points out, the goal of adopting a layers model is to "create a framework that logically divides a network (and services provided over that network) so that policy can then be applied in a more consistent manner."¹¹¹ Thus, public policy considerations should be taken into account when deciding where and how to divide up the protocol layers. Sicker warns us in particular not to be too tightly wedded to the specifics of any particular protocols model. The specifications of the TCP/IP suite deal with the technical characteristics of the protocol, but not necessarily with the business or policy characteristics. "[W]e should not confuse the technical implementation of the Internet with the policy goals of a layered model. What we should take away from the protocol design is its design philosophy; including things like decentralized control, autonomy, efficiency, etc."¹¹²

A number of useful observations can be gleaned from the various commentators. First and foremost, there is an obvious separation between the upper applications layer and the lower physical layer. Economist Michael Katz uses "de-lamination" as a term to describe this fundamental

105. ENTMAN, *supra* note 77, at 2.

106. McTaggart, *supra* note 69, at 1.

107. Bar and Sandvig see a "fundamental separability" between three network components: physical hardware, control software, and communications applications." Bar & Sandvig, *supra* note 2, at 21. As discussed earlier, the Benkler model adopts a three-layer approach (content, logical or code, and physical). Benkler, *supra* note 43, at 562.

108. Sicker, Further Defining a Layered Model, *supra* note 2, at 10-11.

109. Solum & Chung, *supra* note 1, at 32-33 (describing the six layers, which are content, application, transport, IP, link, and physical).

110. Shah, Sicker, and Hatfield propose a model that closely resembles a traditional protocol stack but adds a Layer 0 to represent the physical and power-related issues not generally captured in Layer 1, and also adds a Layer 6 to include issues beyond the layered model and other nonconforming topics (process issues such as standards participation and interconnection negotiations). Shah et al., *supra* note 26, at 16.

111. Sicker, Further Defining a Layered Model, *supra* note 2, at 12.

112. *Id.* at 10.

separation of applications from transport.¹¹³ Second, we should identify separate layers for content and for applications, per Entman, and Sicker, to better help analyze e-commerce and ISP liability issues. Third, as Werbach points out, even though the “[p]hysical and logical infrastructure are tightly coupled” in the voice public switched telephone network (“PSTN”), they remain distinct and separated as engineering concepts.¹¹⁴ Fourth, it is useful to separate out the software that routes network traffic (the logical layer) from the software that is exposed to end users (the application layer).¹¹⁵ Fifth, McTaggart suggests a further refinement of the content layer, including the notion of “transactions” in order to encompass the full range of activities possible on the Internet.¹¹⁶ He defines content as “information which is available on or obtainable by means of, the Internet,” whereas transactions are the dynamic interactions carried out over the Internet.¹¹⁷

Finally, Sicker observes the need to identify two different physical layer networks, the access and the transport. He believes that it is critical to separate the access network (the physical “edge” of the communications network, typically thought of as last-mile telephone facilities provided by local exchange carriers) from the transport network (the physical “core” of the network, typically thought of as long-haul telecommunications provided by interexchange carriers) for a horizontal public policy model to succeed.¹¹⁸ Through regulation or economic incentive, the proper means can be introduced to encourage providers of various services to interconnect on reasonable terms. Where a provider owns multiple layers, Sicker explains, regulation might be imposed to ensure that this player provides reasonable interconnection. Although other models tend not to consider the issues of interconnection, market power, or the transition to such a layered model, each of these issues is critical in creating a workable model. In short, the separation described between the access and transport providers maps to the actual design of existing communications networks.¹¹⁹

113. Michael L. Katz, *Thoughts on the Implications of Technological Change for Telecommunications Policy*, in *TRANSITION TO AN IP ENVIRONMENT, A REPORT OF THE FIFTEENTH ANNUAL ASPEN INSTITUTE CONFERENCE ON TELECOMMUNICATIONS POLICY* (2001) 25-26 (2001).

114. Werbach, *A Layered Model*, *supra* note 2, at 61 n.91.

115. *Id.* at 60 n.89.

116. McTaggart, *supra* note 69, at 5.

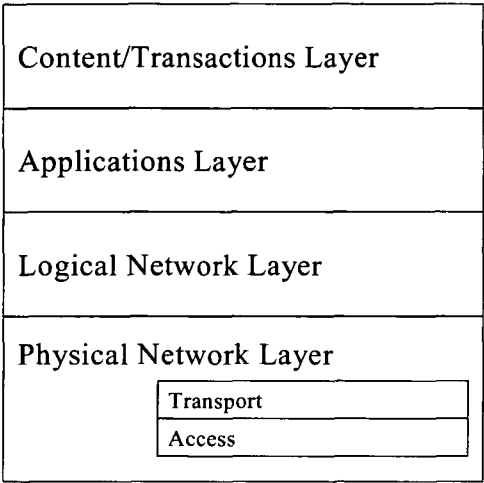
117. *Id.* at 9.

118. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 11.

119. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 10-12.

Thus, incorporating many of these important public policy-related insights, the Author proposes to adopt the Network Layers Model as shown in Figure 7.

Proposed Network Layers Model



*Figure 7*¹²⁰

B. Solum’s “Layers Principle”

The next step is to consider some of the primary analytical elements of the Author’s proposed network layers model. Professor Lawrence Solum of Loyola Marymount University, along with consultant Minn Chung, recently published an extensive paper that lays out some of the fundamental concepts to support a proposed new public policy framework.¹²¹ After describing Professor Solum’s approach in some detail, the Author adopts and supplements his key principles and then extends them to apply to specific examples in the public policy world of IP-based services and applications.

Professor Solum relies in part on the leading work of Professor Lawrence Lessig and his so-called “code thesis,” which in its essence

120. Source: Author.
121. Solum & Chung, *supra* note 1.

describes how computer software is the prime regulator of the Internet.¹²² He explains that the architecture of the Internet has profound implications for its legal regulation. Under the “end-to-end” principle described earlier, the Internet is viewed as a combination of a stupid network and smart applications. As Lessig makes clear, the Internet is transparent to applications (i.e., does not associate data packets with application file types), and this transparency is a built-in characteristic of the layered architecture of the Internet.¹²³

Professor Solum calls his key concept the “layers principle,” which amounts to the general exhortation to “*respect the integrity of the layers.*”¹²⁴ Solum’s layers principle can be defined by the following statement: “*Public Internet regulators should not adopt legal regulations of the Internet (including statutes, regulations, common law rules, or interpretations of any of these) that violate the integrity of the [layered nature of Internet architecture], absent a compelling regulatory interest and consideration of layer-respecting alternatives.*”¹²⁵

In his paper, Professor Solum describes two interrelated corollaries in support of his layers principle:

Corollary One: The Principle of Layers Separation

Regulation should not violate or compromise the separation between layers designed into the basic infrastructure of the Internet, so that one layer of the Internet would differentiate the handling of data on the basis of information available only at another layer, absent a compelling regulatory interest.¹²⁶

Corollary Two: The Principle of Minimizing Layer Crossing

If compelling regulatory interests require a layer-crossing regulation, “that regulation should [minimize] the distance between the layer at which the law aims to produce an effect and the layer directly targeted by legal regulation.”¹²⁷

Solum indicates that two theses form the supporting pillars that provide a compelling justification for the layers principle and its two foundational corollaries, the transparency thesis and the fit thesis.¹²⁸

122. *Id.*; LESSIG, CODE AND OTHER LAWS, *supra* note 36, at 30-60.

123. LESSIG, THE FUTURE OF IDEAS, *supra* note 42, at 34-37. For example, the TCP/IP protocol is independent from the underlying computer hardware or operating system. See STEVENS, *supra* note 27, at 5.

124. Solum & Chung, *supra* note 1, at 29.

125. *Id.* at 42 (emphasis added).

126. *Id.* at 29-31, 42-43.

127. *Id.* at 43.

128. *Id.* at 51-52.

The Transparency Thesis: “The fact that layer violating regulations inherently damage the transparency of the Internet, combined with the fact that Internet transparency lowers the barriers to innovation, provides compelling support for the principle of layer separation. . . .”¹²⁹

The Fit Thesis: “The fact that layer-crossing regulations result in an inherent mismatch between the ends such regulations seek to promote and the means employed implies that layer-crossing regulations suffer from problems of overbreadth and underinclusion. . . .”¹³⁰ To avoid these problems, Internet regulators are required to abide by the principle of minimizing layer-crossing regulations.¹³¹

Solum explains that the layers principle rests on a solid foundation of engineering facts and norms because “the layers are separated for sound reasons of network engineering.”¹³² As we have seen previously, each layer depends on lower ones; to avoid replicating functions in higher layers, one should put in a lower layer to serve all higher layers. As a result, functions normally should not cross layers unless there is an exceptional reason to do so. In Solum’s view, “horizontal communication requires vertical transparency.”¹³³ Professor Solum continues, “The lower layer, by design, cannot or is not supposed to discriminate the payload from the upper layer based on its content, or modify the content.”¹³⁴ He points out that “the lower layer is transparent with respect to the upper layer.”¹³⁵ Transparency means that the Internet is a neutral platform; anyone can develop network applications with or on top of the TCP/IP protocol, with no permission necessary.¹³⁶

Solum’s proposed six-layer model includes the content, application, transport, network (IP), link, and physical layers.¹³⁷ In his model, the public conduit function of the Internet operates mainly at the IP layer and the physical layer below it. The IP layer is the greatest common denominator of the publicly shared resources on the Internet. It is the function of the IP layer, along with the “stupid” hop-by-hop routing design, that fuses multitudes of disparate networks into an apparently single, unified, seamless network.¹³⁸

129. *Id.* at 52.

130. *Id.*

131. *Id.* at 51-53.

132. *Id.* at 25.

133. *Id.* at 26.

134. *Id.*

135. *Id.*

136. *Id.* at 25-27.

137. *Id.* at 27-28.

138. *Id.* at 26-28.

C. *The Layers Principle and Informed Decisionmaking*

In Professor Solum's view, applying the layers analysis (by identifying the layer of the problem conduct and the layer where the regulation operates) provides a more concrete analysis of the issues by placing the disputed function at a proper layer and providing a correct focus on the relevant operation of the Internet. In essence, the legal regulation can only be as effective as is permitted by the architecture of the Internet. And, in turn, the nature and limitations of the legal regulation will be determined by the nature of the code being implemented.¹³⁹

Solum discusses the proper role of policymakers and regulators in determining whether or not to adopt and enforce a regulation that affects the Internet. Initially he defends the need for regulators to utilize the layers principle in fashioning policy, as opposed to using a more case-by-case, incremental approach.¹⁴⁰ In a nutshell, his case against "incrementalism" revolves around: (1) "the tyranny of small decisions,"¹⁴¹ (2) ignorance of unforeseen and unintended consequences; (3) damage to the transparency of the Internet inherent in the nature of the layers-violating regulations, (4) Kenneth Arrow's "information paradox,"¹⁴² and (5) institutional capacity (regulators are ill-prepared to understand Internet architecture).¹⁴³

Solum also states that the layers principle and its corollaries should be treated by prospective regulators as presumptive rules of decisions. "[B]efore adopting a layer-violating regulation, a regulator must articulate a compelling regulatory justification."¹⁴⁴ At a minimum, "decision makers should be required to consider the availability of layer respecting alternatives."¹⁴⁵

The layers principle also can be employed as an aid to statutory interpretation. For example, as part of explicating the meaning of "the public interest" standard in the Communications Act,¹⁴⁶ "the layers principle can give more particular and concrete meaning to the ambiguous

139. *Id.* at 28-29.

140. *Id.* at 38-41.

141. *Id.* at 34.

142. Arrow's paradox is that we cannot know the innovation costs of damaging the transparency of the Internet, but we must consider those costs when formulating Internet regulatory policy. *See id.* at 36.

143. *Id.* at 33-38.

144. *Id.* at 39 (emphasis omitted).

145. *Id.* at 40 (emphasis omitted).

146. *See* 47 U.S.C. §§ 214(a), 310(d) (2000).

statutory command.”¹⁴⁷ The layers principle can also be used to fill statutory gaps and to narrow or broaden legal text where appropriate.¹⁴⁸

Finally, Solum recognizes that the layers principle is only as valid as the network engineering concepts that inform it. As he puts it:

The layers principle is supported by sound considerations of network engineering. But there is no reason to believe that these principles of network design are written in stone for all time. As the Internet evolves, it is possible that superior architectures may be conceived. Moreover, just as the Internet changed the total electronic communications system, there may be similar revolutionary innovations in the future.¹⁴⁹

Thus, the layers principle should be viewed as far more than merely provisional, but something less than absolute.

D. Another Public Interest Aspect: Creating and Preserving The “Innovation Engine”

Commentators also draw interesting public policy lessons from the robust innovation evidenced on the Internet. To many, policymakers must ensure that the upper layers of content and applications remain competitive and free from any untoward influence, from either public (government) or private (corporate) actors. As one example, Professor Solum discusses how “nearly all user functions are implemented at the upper application layer.”¹⁵⁰ Solum continues, “Thus, innovation is decentralized and placed in the hands of individual innovators,” and the Internet can become an “innovation commons.”¹⁵¹

The work of Professor Yochai Benkler expands further on the idea of the Internet as an innovation commons. Professor Benkler describes how the Internet helps disrupt the traditional producer/consumer model by empowering the rise of end users who can play both roles as part of a continuing conversation and exchange of information. The “Great Shopping Mall” can be transformed into the “Great Agora,” featuring unmediated conversation of the many with the many.¹⁵²

Benkler addresses the network layers concept in his theory of the proper role of regulation:

We are making regulatory choices at all layers of the information environment—the physical infrastructure, logical infrastructure, and

147. Solum & Chung, *supra* note 1, at 46.

148. *Id.* at 45-46.

149. *Id.* at 42.

150. *Id.* at 27.

151. *Id.*

152. Benkler, *supra* note 43, at 565.

content layers—that threaten to concentrate the digital environment as it becomes more central to our social conversation. . . . At all these layers, the wrong decisions could enable a reproduction of the mass media model, with all its shortcomings, in the digitally networked environment. Avoiding making these mistakes should be the focus of the efforts we have traditionally focused on structural media regulation.¹⁵³

Regulatory choices that “assume a producer/consumer model often perpetuate this model by regulating in a manner that increases the costs of becoming a producer of information.”¹⁵⁴ Professor Benkler asserts that this scenario leads inevitably to:

Concentration—because the cost of becoming a professional provider of the type whose activity is facilitated by the regulation creates an entry barrier.

Commercialization—because of the high cost providers must adopt a strategy that relies on sale of their information and cultural products . .

Homogenization—because most producers must be commercial, their reasons to produce are similar, and their need to attract wide audiences leads to convergence of the content towards the mainstream and the inoffensive.¹⁵⁵

Other commentators have observed the strong correlation between robust, ends-oriented innovation and the architecture of the Internet. Lee McKnight notes that innovation is the key factor enabling growth and change in capitalist economies,¹⁵⁶ and that in turn “the Internet works its magic through rapid development and diffusion of innovations.”¹⁵⁷ The Internet Protocol acts as a “bearer service”—the general purpose platform technology linking technologies, software, services, customers, firms, and markets—so that the Internet is “an innovation engine that enables creation of a remarkable range of new products and services.”¹⁵⁸ McKnight argues that an open communications infrastructure policy framework is best suited to foster innovation and growth, although “legal and political forces may

153. *Id.* at 568.

154. *Id.* at 575-76.

155. *Id.* at 576. In a related observation, Philip Weiser points out that “70 percent of the three billion or so web pages are built by individuals from their desire to share ideas, rather than to make money.” Weiser, *supra* note 15, at 33 n.147 (quoting Kevin Kelly, *The Web Runs on Love, Not Greed*, WALL ST. J. (Jan. 3, 2003), at A8).

156. See Lee W. McKnight, *Internet Business Models: Creative Destruction As Usual*, in CREATIVE DESTRUCTION: BUSINESS SURVIVAL STRATEGIES IN THE GLOBAL INTERNET ECONOMY at 39-41 (Lee W. McKnight et al. eds., 2001).

157. *Id.* at 41 (citation omitted).

158. *Id.* at 40 (citation omitted).

intentionally or inadvertently foster innovation—or suppress it.”¹⁵⁹ Michael Katz believes that “[t]he hourglass architecture allows innovations to take place at the application and transport layers separately. This ability for independent innovation speeds the rate of innovation and increases the ability of entrepreneurs to take advantage of new opportunities.”¹⁶⁰

Lawrence Lessig describes how the “end-to-end principle renders the Internet an *innovation commons*, where innovators can develop and deploy new applications or content *without the permission of anyone else*.”¹⁶¹ Others demonstrate how the benefits of the end-to-end design include the way it facilitates user control and power, innovation, flexibility, competition, and reliability. In particular, Shah notes, “rather than relying upon the creativity of a small group of innovators who might work for the companies that control the network, the end-to-end design enables anyone with an Internet connection to design and implement a better way to use the Internet.”¹⁶² Lessig also claims that “[t]o those who argue that control is necessary if innovation is to occur, and that more control will yield more innovation, the Internet is the simplest and most direct reply.”¹⁶³

The very uncertainty stemming from the potential of future innovation is yet another reason for policymakers to refrain from direct regulation of the upper layers. Lessig states that “the network is open to adopting applications not originally foreseen by the designers.”¹⁶⁴ When the future is uncertain (when future uses of a technology cannot be predicted), leaving the technology uncontrolled is a better way of facilitating the right sort of innovation. Plasticity—the ability of a system to evolve easily in a number of ways—is optimal in a world of uncertainty.¹⁶⁵ Douglas Sicker also observes that new applications can quickly enter this space and

159. *Id.* at 42 (citation omitted).

160. Katz, *supra* note 113, at 26. Weiser also sees the Internet as “a uniquely suitable platform for innovation.” Weiser, *supra* note 15, at 22. In a later article co-authored with Joseph Farrell, Weiser observes that modular industry structures like the Internet “enable independent firms to introduce innovations into an established environment,” and can “facilitate innovation in individual components, spur entry, and result in lower prices.” Joseph Farrell & Philip J. Weiser, MODULARITY, VERTICAL INTEGRATION, AND OPEN ACCESS POLICIES: TOWARDS A CONVERGENCE OF ANTITRUST AND REGULATION IN THE INTERNET AGE 11 (Competition Policy Ctr., Univ. of Calif., Berkeley, Paper No. CPC02-035, 2003) (footnote omitted), available at <http://repositories.cdlib.org/iber/cpc/CPC02-035>. “Modularity thus allows for a smooth dissemination of the best of breed in each level or layer, as users mix-and-match components.” *Id.* (footnote omitted).

161. LESSIG, THE FUTURE OF IDEAS, *supra* note 42, at 40 (emphasis in original).

162. Shah et al., *supra* note 26, at 6.

163. LESSIG, THE FUTURE OF IDEAS, *supra* note 42, at 14.

164. *Id.* at 37.

165. *Id.* at 39.

radically change the landscape. “[I]t is this dynamic nature of the application space that suggests that the government . . . use prudence when considering policy.”¹⁶⁶

There is also considerable support for linking technological innovation to evolutionary theories. In August 2003, Wu and Lessig told the FCC:

In the academic literature, the Commission has endorsed the evolutionary, or competitive model of innovation. It holds that the process of technological innovation proceeds most rapidly through a survival-of-the-fittest competition between new technologies, and it encourages policies to ensure a fair fight among competing innovations. If this “Darwinian evolution” is the best path of innovation, it follows that the most promising path of development will be difficult to predict in advance. Hence despite the “waste” generated by a competitive process, the results will be superior to planned innovation directed by a single prospect holder, however well-intentioned. That entity will suffer from cognitive biases (such as a predisposition to continue with current ways of doing business) that make it unlikely to come to the right decisions, even if it means well.¹⁶⁷

Innovation and the Internet also are closely aligned with proponents of the school of “creative destruction.” McKnight claims that “the seeming chaos of rapid market rises to prominence of new firms, new technologies, and new business models is not a passing phenomenon, but rather is a permanent feature of an Internet economy.”¹⁶⁸ Because of this, he writes, “the Internet enables creative destruction as usual.”¹⁶⁹

Of course, innovations are not limited to the content and applications layers, or to consumer-facing retail offerings. Innovation also happens deep in the logical and physical infrastructure of the network. Indeed, layering

166. Sicker, *Layered Policy Model*, *supra* note 95, at 10.

167. Letter from Timothy Wu, Assoc. Prof., Univ. of Virginia Law School, and Lawrence Lessig, Prof., Stanford Law School, to Marlene H. Dortch, Secretary, FCC, CS Docket No. 02-52, at 5 (Aug. 22, 2003) [hereinafter Wu & Lessig Letter]; *see also* Timothy Wu, *Network Neutrality & Broadband Discrimination*, 2 J. ON TELECOMMS. & HIGH TECH. L. 5 (2003). Adherents to this evolutionary model view the innovation process as a survival-of-the-fittest competition among developers of new technologies. “They are suspicious of models of development that might vest control in any initial prospect-holder, private or public, who is expected to direct the optimal path of innovation, minimizing the excesses of innovative competition.” *Id.* at 4-5. The most promising path of development is difficult to predict in advance. Some evolutionary theorists view a communications network like the Internet as a platform for a competition among application developers. “It is therefore important that the platform be neutral to ensure the competition remains meritocratic.” *Id.* at 5. Backers of an evolutionary approach to innovation take the Internet as evidence of the superiority of a network designed along evolutionary principles. *Id.* at 5-6.

168. McKnight, *supra* note 136, at 40.

169. *Id.*

with IP at the center allows for significant network innovation below, as well as above, the IP layer. And recent history shows that much of that innovation comes not from established incumbents guarding legacy market positions, but from hungry, eager competitors. For example, it is well established that data CLECs such as Covad, Rhythms, and Northpoint were the early adopters of Digital Subscriber Line ("DSL") technology as a broadband platform. In contrast, the ILECs were not early adopters of this technology because the incumbents feared cannibalization of their profitable T-1 services.¹⁷⁰ So, the purpose of competition at the lower layers is not merely to hold in check market power that could damage innovation at the upper layers. In itself, competition within the logical and physical layers provides a valuable spur to infrastructure innovation and investment by all parties, which in turn provides significant benefits to the upper layers, and also reduces the need for regulation overall as the market becomes more competitive.

E. Defining and Guarding Against Market Power Abuse in the Layers

According to Craig McTaggart, "one of the most difficult questions of telecommunications and information technology law in the 21st century [is] whether competition law is capable of protecting the public interest in the Internet environment."¹⁷¹ In a world where policymakers would begin to look to the horizontal network layers model to guide the development of public policy, a well-developed theory of market power abuse, coupled with strong and effective enforcement tools, is a must. While this Article is not intended to provide a comprehensive and nuanced economic analysis suitable for a robust layers framework, a few general points are raised below.

In the United States, the antitrust laws broadly define the scope of unacceptable market power, and abuses of such power. In turn, the case-by-case determinations of market power, and any possible remedies for abuse of that power, are left to the U.S. Department of Justice ("DOJ") (an arm of the Executive Branch) and the Federal Trade Commission ("FTC") (an independent regulatory agency). The joint DOJ/FTC "Horizontal Merger Guidelines" establish the methodological tools that the two agencies will

170. See, e.g., Todd Spangler, *Initiatives Underscore DSL Future*, INTERNET WORLD, Mar. 16, 1998 (Analysts suggest that "telcos are reluctant to bring to market DSL service on the order of 1 to 1.5 Mbps. . . because doing so would cannibalize the lucrative business of selling dedicated circuits, such as T-1 lines, for access."), available at http://www.findarticles.com/cf_dls/m0DXS/n10_v4/21049642/p1/article.jhtml.

171. McTaggart, *supra* note 69, at 21.

employ in reviewing mergers between companies in the same or related industries.¹⁷² Relevant product markets are defined, and market concentration measured with the assistance of the Herfindal-Hirschman Index (“HHI”), which assesses the market shares of each entity. The HHI measures relative concentration within a market, anywhere from approaching zero (numerous small competitors) up to 10,000 (completely monopolized). HHI factors above 1,800 indicate potentially significant competitive concerns.¹⁷³ On the other hand, where the FCC is involved in reviewing a proposed merger between regulated entities, the touchstone is whether the transaction would be in the “public interest.”¹⁷⁴

In 2002, the European Union took a major step towards combining competition law and a regulatory framework guided by the horizontal layers principle.¹⁷⁵ As Rob Frieden explains it:

The European Commission has considered whether a horizontal regulatory and policy orientation would provide a better outcome. . . . It attempts to use a harmonized regulatory approach that makes a functional assessment of what a company currently provides and whether it possesses market power, rather than who provides a service in that provider’s “legacy” regulatory status. The EU attempted to use a harmonized regulatory approach that makes a functional assessment of what a company currently provides and whether it possesses market power.¹⁷⁶

The market power assessment revolves around the concept of Significant Market Power (“SMP”), as developed by the European Commission.¹⁷⁷

172. *See generally*, Horizontal Merger Guidelines, 57 Fed. Reg. 41,552 (1992, as revised in 1997); *see also* Marcus, *supra* note 93, at 7-9 (providing a brief overview of U.S. antitrust law, agencies, and methodologies).

173. Horizontal Merger Guidelines, 57 Fed. Reg. 41,552 § 1.5 (Concentration and Market Shares).

174. Pursuant to Sections 214(a) and 310(d) of the Communications Act, the Commission must determine whether proposed transfers of control of licenses and authorizations will serve the public interest. 47 U.S.C. §§ 214(a), 310(d) (2000). The FCC’s public interest standard includes an evaluation of the effect of the proposed transaction on competition, consistency with specific provisions of the Act, other applicable statutes, and the Commission’s rules and policies, and in some cases, a consideration of the impact on program and viewpoint diversity. *See, e.g.*, Application of EchoStar Comm. Corp., *Hearing Designation Order*, 17 F.C.C.R. 20559, paras. 24-27 (2002).

175. Directive 2002/21/EC of the European Parliament and of the Council of 7 Mar. 2002 on a Common Regulatory Framework for Electronic Communications Networks and Services (Framework Directive), 2002 O.J. (L. 108) 33.

176. Frieden, *supra* note 74, at 213.

177. Commission Guidelines on Market Analysis and the Assessment of Significant Market Power Under the Community Regulatory Framework for Electronic Communications Networks and Services, 2002 O.J. (C 165) 6.

The European Union's new regulatory framework presents an interesting case of an explicit endorsement and adoption of the horizontal way of thinking about regulatory policies and market power. Rather than apply regulation based on specific service definitions, the EU's framework establishes a neutral process for determining whether to apply regulation and when to remove it. As Frieden describes it:

The EU approach separates content from conduit and subjects either horizontal layer to regulation only where market distortions have occurred, or potentially may occur in view of the market power exercised by one or more stakeholders. The primary regulatory oversight model derives from general antitrust/competition policy rather than from an industry- or service-specific predicate. Regulation occurs if and only if competition does not exist in a particular geographic or specific market, and existing regulatory obligations may be withdrawn on the basis of market analysis.¹⁷⁸

In the United States, the economic literature on layering rightly focuses on the appropriate exercise of the government's authority to curb anticompetitive activity at different levels, known as the "de-lamination" process. Michael Katz has explained that the "de-lamination" of transport and applications layers "should be taken into account in assessing market power and determining the appropriate treatment of firms under merger policy, price regulation, and interconnection obligations."¹⁷⁹ As de-lamination continues, the assessment of market power should largely take place at each layer separately.¹⁸⁰

Douglas Sicker states that there are sound reasons to treat providers with market dominance at a given layer differently from providers without such market dominance.

While similar policy will be applied to all service providers, those determined as having significant market power will have additional obligations. When a player is determined to have significant market power, a pricing condition will be invoked. This condition will vary depending on power exerted; whether the player controls multiple layers or significantly controls a particular layer.¹⁸¹

Looking in particular at the transport layer, Michael Katz writes that it is useful to focus on "bottleneck assets" or "network choke points" as sources of market power, as long as networks remain interconnected.

A bottleneck is created when one or very few providers possess an asset (for example, transport facilities) that is critical to competitive

178. Frieden, *supra* note 74, at 248.

179. Katz, *supra* note 113, at 28.

180. *Id.* at 37.

181. Sicker, *Layered Policy Model*, *supra* note 95, at 8.

success and cannot readily be obtained by rivals. . . . In the case of local access networks, economies of density and scale, coupled with the sunk-cost nature of network investments, have created a system in which incumbents may have preempted additional entry to serve most end users, including single-family residences.¹⁸²

Additionally, entry is preempted to most end-user services, such as small businesses and large businesses in less densely populated areas.¹⁸³

Of course, as Phillip Weiser observes, one cannot assume that the exclusive gatekeeper will only exist at the physical layer.¹⁸⁴ Indeed, a recent study solicited by the European Commission explains that Next Generation Networks (“NGNs”) likely will contain new “control points” that can reside in any layer or “plane” of the network hierarchy.¹⁸⁵ Another report prepared for the EC focuses on the need to adopt a coherent regulatory strategy with regard to naming, numbering, and addressing resources (“unique identifiers”) occupying “shifting control points” in the logical layers in a newly-converged environment.¹⁸⁶ Katz also notes that the analysis of market power at the applications layer is likely to focus on somewhat different factors, such as “intellectual property rights; first-mover advantages resulting from large fixed and sunk development costs; and network effects.”¹⁸⁷ Lee McKnight adds that, as entities seek to obtain market power through establishment of a controlling position in access markets, a “new information and communication policy architecture” is necessary.¹⁸⁸ In his view, this architecture should be built on four principles: open architecture, open access, universal access, and flexible access.¹⁸⁹ Finally, Michael Weisman cautions that a strong antitrust-type

182. Katz, *supra* note 113, at 37.

183. *Id.*

184. Weiser, *supra* note 15, at 13.

185. Aurelie Dame et al., Devoteam Siticom & Cullen Int’l, Regulatory Implications of the Introduction of Next Generation Networks and Other New Developments in Electronic Communications: Executive Summary 1 (2003), available at http://europa.eu.int/information_society/topics/telecoms/regulatory/studies/documents/regulatory_implications_execsum.pdf. Where such control points involve anticompetitive dominance over “upper plane” elements such as network capabilities, elementary services, user access capabilities, or individual user information, regulators will need to consider fashioning ex ante regulations and/or applying ex post remedies. See *id.* at 9-10.

186. Political Intelligence, Policy Implications of Convergence of Naming, Numbering, and Addressing: An Orientation, Executive Summary, Final Report of the European Commission, Sept. 2003, at 11-12.

187. Katz, *supra* note 113, at 37-38.

188. McKnight, *supra* note 136, at 55.

189. *Id.*

enforcement role, while difficult in practice, is necessary in theory across all layers.¹⁹⁰

In short, unregulated market power is counter-innovation. Monopoly essentially acts as the worst form of "regulation" by inhibiting activities in otherwise competitive markets. Policymakers must use the network layers concept to develop a more sophisticated understanding of the deleterious effects of unconstrained market power, and take action if necessary to preserve the "innovation commons" of the Internet and other data-centric networks.

IV. APPLYING THE LAYERS PRINCIPLE: THE PUBLIC POLICY IMPLICATIONS

In general, so-called "regulation of the Internet" comes in two different guises: (1) common carrier-type entry, exit, and service regulation by federal and state regulatory bodies (primarily the Federal Communications Commission ("FCC") and state public utility commissions ("PUCs")); and (2) legal liability imposed on ISPs by statute or regulation (primarily the U.S. Congress, FTC, and state legislatures). Telecommunications regulators in other countries, and international bodies such as the Internet Corporation for Assigned Names and Numbers ("ICANN") and the Organization for Economic Cooperation and Development ("OECD"), also play roles in Internet-related matters. For example, the FCC's adoption of rules concerning VoIP could be considered the first kind of Internet regulation, while the European Commission's adoption of rules governing spam could constitute the second kind of Internet regulation. Generally speaking, traditional communications regulation should focus on the lower (physical and network) layers, while Internet content-related regulation should focus on higher (applications and content) layers.

Professor Solum emphasizes employing the layers principle in situations where policymakers must be dissuaded from imposing legal or regulatory burdens on the upper layers of the end-to-end Internet (in other words, e-commerce issues involving potential ISP liability).¹⁹¹ The key implications of Solum's approach, which he lays out in admirable detail in his own paper, will be discussed briefly in Part A. In addition, this Article

190. Weisman, *supra* note 91, at 30. "Although the Internet may be a layered network, corporate business plans in the United States often focus on vertical integration." *Id.* at 25. "[I]n practice, companies will do almost anything to avoid competition. They will gladly surrender markets and products lines to avoid the 'ruinous' price competition that strips monopoly rents out of the revenue stream." *Id.* at 27.

191. Solum & Chung, *supra* note 1, at 53-102.

builds on Solum's thinking by providing a separate, more extensive analysis centered on employing the layers principle in the telecommunications regulatory context. In particular, Part B focuses on situations where policymakers must be persuaded to impose legal and/or regulatory obligations on the lower layers of the last-mile facilities leading to and from the Internet, where necessary, and not on the actual IP services or applications themselves.

A. *The Layers Principle and ISP Liability*

Professor Solum categorizes two broad types of violations of the layers principle: those that occur at the TCP/IP layers, and those that occur at the more generalized communications system layers.¹⁹² In both cases, the impermissible regulating behavior can come either from public actors (government authorities) or private actors (individual companies) acting on their own or under color of law. Solum's examples summarized below employ the specific layers (content, application, transport, IP, link, and physical) defined in his own horizontal layering model.

1. Regulations that fail to respect the integrity of the TCP/IP layers

Layers violations primarily involve situations where regulation is directed at a lower protocol layer in order to address problems that originate at an upper layer, particularly the content layer. Solum provides several examples, such as (1) the music distribution industry seeking to target the TCP/IP layers to combat peer-to-peer networking, (2) policymakers asserting control over Internet content; and (3) blocking or filtering requirements.¹⁹³ Generally speaking, the more narrowly the regulation focuses on the layer it is attempting to control, the lesser it will impair other layers, reduce transparency, or cause substantial "innocent use" problems.

a. *Physical Layer Regulation Aimed at Content Layer Problems*

This type of regulation, as demonstrated by the following examples, involves the most extreme, albeit rarest, layer violations.

192. *Id.* at 53.

193. *Id.* at 53-55.

i. Myanmar's "Cut the Wire" Policy

Until January 2002, the government of Myanmar, the country formerly known as Burma, allowed no general public access to the Internet, permitting access by only twelve companies.¹⁹⁴ Under the terms of a 1996 "Communications Computer Law," anyone attempting to use the Internet without prior sanction from the government would face up to fifteen years in prison. To enforce this law, "[t]elephone lines were tapped, and fax machines, modems, computers and satellite dishes [had] to be registered with the government. Any unauthorized use or possession of 'illegal' devices resulted in significant penalties and imprisonment."¹⁹⁵ Myanmar officials apparently feared that the Internet would be a source of negative influence for their citizens.

Today, Internet usage in Myanmar continues to be stifled due to strict censorship, blocking on certain political Web sites, and a prohibition on cross-border purchases.¹⁹⁶ Individuals wishing to access the Internet first must obtain a license from the Ministry of Communications, Posts, and Telegraph ("MPT")—which has the only Internet server in the country—and permit the government to monitor content for any "anti-nationalistic" sentiment. Use of the Internet for political speech is strictly prohibited.¹⁹⁷

ii. U.S. Proposal to Sever Serbian Internet Access

In May 1999, as the result of an Executive Order issued by President Clinton forbidding the transmission of services to Yugoslavia, the U.S. government ordered American ISPs to cut all Internet links belonging to Yugoslav web suppliers.¹⁹⁸ On May 13, in what some have characterized as

194. "The military junta—the State Peace and Development Council-- had been so effective in closing down Myanmar . . . that it has been included in the 'top 20 enemies of the Internet' list released by Reporteurs Sans Frontieres last year." Swaroopa Iyengar, *Myanmar's Tangled Web*, WIRED NEWS, at <http://www.wired.com/news/politics/0,1283,39631,00.html> (Oct. 30, 2000).

195. *Id.*

196. *Myanmar Internet Use Increasing, But Still Censored*, VIGILANT.TV, at <http://vigilant.tv/article/2383> (Oct. 25, 2002).

197. Similar policies exist in Tunisia, where all private ISPs must be routed through a state agency, which maintains control over all of the protocols and the country's only international gateway. Human Rights Watch, *The Internet in the Mideast and North Africa: Free Expression and Censorship, Tunisia* (June 1998), available at <http://www.hrw.org/advocacy/internet/mena/tunisia.htm>. Further, Tunisia holds ISPs legally responsible for the content of Web sites they host and requires ISPs to furnish lists of subscribers to the government. The Tunisian government also attempts technical controls of the Internet, including filtering content and actively posting its own online material. Andrew Stroehlein, *Tunisia Stifles Web Publications*, USC ANNENBERG ONLINE J. REV., (Nov. 7, 2002), available at http://www.ojr.org/ojr/world_reports/1036538983.php.

198. *Cutting Off Internet*, DIASPORA (May 13, 1999), available at

“a flagrant violation of commercial contracts with Yugoslav ISPs, as well as an attack on freedom of the Internet,”¹⁹⁹ the U.S. government ordered the Loral Orion company to shut down its satellite feeds for Internet customers in Yugoslavia. “After receiving thousands of protests, Loral Orion [reportedly] reversed its decision to sever satellite Internet service to Yugoslavia,” stating that the prohibition of commerce with that country did not adversely affect Internet services.²⁰⁰

b. IP Layer Regulation Aimed at Content Layer Problems

Content regulation that operates at the IP Layer presents a more common form of layer-violating regulation than the category discussed in the previous Part.

i. French Yahoo! Case

In what was widely viewed as a “setback for free expression on the Internet,” a French court ruled in November 2002 that U.S.-based Yahoo!, Inc. should be held legally liable under a French law prohibiting the exhibition or sale of objects with racist overtones.²⁰¹ The court held that Yahoo! unlawfully allowed French citizens to access auction sites for World War II Nazi memorabilia.²⁰² It is important to note that the Yahoo! website in question was not Yahoo.fr, which is specifically developed to cater to France and its citizens, but rather the Yahoo.com site, whose servers are physically located outside France and whose content is focused on serving the citizens of the United States. The French court’s ruling subjected Yahoo! to fines in excess of \$13,000 per day unless the company agreed to install a keyword-based blocking system that prevented French citizens from seeing the offending Yahoo! sites.²⁰³ The ruling was viewed by many observers as “impractical to implement on a large scale and highly imperfect at identifying Internet users by country. It also [was seen as setting] a dangerous precedent for countries seeking to impose restrictions on speech outside their borders.”²⁰⁴

net.org/food4thought/cutting_off_internet.htm.

199. Letter from BeoNET to Alexander Cockburn & Jeffrey St. Clair, editors of CounterPunch, *US Shuts Down Yugoslav Internet*, COUNTERPUNCH (May 12, 1999), at <http://www.counterpunch.org/beograd.html>.

200. *Antiwar Protests Reverse Satellite Company’s Decision to Cut Internet Service to Yugoslavia*, ANTIWAR.COM (May 15, 1999) at <http://www.antiwar.com/satellite1.html>.

201. *French Court Holds Yahoo Accountable for U.S. Auction Content*, CDT POLICY POST, Vol. 6, No. 20, Nov. 21, 2000, at http://www.cdt.org/publications/pp_6.20.shtml.

202. *Id.*

203. *Id.*

204. *Id.*

In November 2002, a U.S. federal court rejected the French court's ruling, establishing an important precedent for future attempts at content regulation across national borders. In reaching its decision, the U.S. court questioned whether each government would be able to impose restrictions on every other country relative to their domestic servers.²⁰⁵ In February 2003, the French criminal court dismissed criminal charges against Yahoo!.²⁰⁶

ii. Pennsylvania Anti-Child Pornography Law

In September 2002, pursuant to a new statute in Pennsylvania, the Court of Common Pleas issued an order directing MCI (then WorldCom) and its ISP subsidiaries to block access by its subscribers in Pennsylvania to five specified URLs on the Internet.²⁰⁷ The five URLs in question were suspected of posting child pornography material in violation of the Pennsylvania law. MCI had no relationship to the sites listed in the order, as it neither hosted any of the sites nor had any other legal or physical control over any of the sites or the content contained in them. In order to comply with the order, MCI was forced to block access to the IP addresses associated with two of the sites. As a result, all users of MCI's North American Internet network, including users located inside and outside of Pennsylvania, temporarily were unable to access any Web sites or other content or services that shared the IP addresses of the sites at issue.²⁰⁸ Generally, it is not technically feasible for an ISP to block access to a site on the Internet only to subscribers located within a specific state, as Internet networks do not recognize the geographical boundaries of states.²⁰⁹

205. *Yahoo! Inc. v. La Ligue Contre Le Racisme et L'Antisemitisme*, 169 F. Supp. 2d 1181, 1192-1193 (N.D. Cal. 2001). An *amicus curiae* brief filed by a dozen public interest groups stated:

If French law can be enforced here, Yahoo! could likewise be required to block access to information that 'sabotages national unity' in China, undermines "religious harmony and public morals" in Singapore, offends "the social, cultural, political, media, economic and religious values" of Saudi Arabia, fosters "pro-Israeli speech" in Syria, facilitates viewing unrated or inappropriately rated Web sites in Australia, or makes available information "offensive to public morality" in Italy. . . .

Brief of Amici Curiae CDT et al., at 13, *Yahoo! Inc. v. La Ligue Contre Le Racisme et L'Antisemitisme*, 169 F. Supp. 2d 1181 (N.D. Cal. 2001) (No. 01-17424).

206. Center for Democracy & Technology, *French Court Rules in Favor of Yahoo! in Internet Free Speech Case*, at <http://www.cdt.org/jurisdiction> (Feb. 11, 2003).

207. See Letter from Craig Silliman, Director, Technology and Network Legal, WorldCom, to John J. Burfete, Jr., Chief Deputy Attorney General, Office of the Attorney General of Pennsylvania 3 (Sept. 23, 2002) (on file with the Journal).

208. *Id.*

209. *Id.*

All known efforts to map IP addresses to Content Layer information—geographical locations or national identifications—are layer-violating actions, so that mapping is both over-inclusive and under-inclusive.²¹⁰ Solum observes that one possible solution that would be both more effective and less damaging to the transparency of the Internet would be the use of digital certificates with encoded geographic or national identification at the Application/Services Layers, combined with application proxy servers acting as firewalls.²¹¹

c. Transport Layer Regulation Aimed at Content Layer or Application Layer Problems

i. The Blocking of Peer-to-Peer File Sharing by ISPs

Some consumer ISPs have been alleged to routinely block particular ports such as web servers in an apparent attempt to prevent peer-to-peer file sharing. In 2002, RoadRunner reportedly blocked the use of KaZaA software and services in certain markets to prevent peer-to-peer sharing of copyrighted music. In Texas, RoadRunner employed the use of a port scanner to detect KaZaA activity. Once such activity was detected, RoadRunner disabled the port, rendering the program, as well as other “FastTrack” programs such as Grokster and iMesh, completely useless.²¹²

ii. Panama Blocks VoIP

In an apparent attempt to stem telephone company revenue losses due to Internet telephony, the government of Panama decreed in November 2002 that twenty-four User Datagram Protocol (“UDP”) server ports be blocked by all Internet service providers.²¹³ The ports included those that were commonly used for VoIP services, as well as other purposes, presumably with the idea that these too could be used to circumvent the

210. Solum and Chung, *supra* note 1, at 89-90 (noting MCI’s objections to the Pennsylvania blocking order in juxtaposition to layers analysis generally, and the “fit thesis” particularly).

211. *Id.* at 88. *But see* Jonathan Zittrain, Internet Points of Control, Harvard Law School Public Law, Research Paper No. 54 (2003) at 21-28, available at http://ssrn.com/abstract_id=388860 (discussing, with approval, the Pennsylvania statute as appropriately compelling “destination ISPs” to assist in control of Internet content).

212. RoadRunner Blocking Use of Kazaa, SLASHDOT, at <http://yro.slashdot.org/yro/02/07/14/0237258.shtml?tid=153> (July 13, 2002).

213. Panama Begins Blocking IP Ports, LINUX AND MAIN, at <http://www.linuxandmain.com> (Nov. 3, 2002).

national telephone network in making telephone calls at some point in the future.²¹⁴

d. IP Layer Regulation Aimed at Transport or Application Layer Problems

i. Chinese Government Blocking Access to Search Engines

The Chinese government in mid-2002 began blocking access to Internet search engines Google and AltaVista under a widespread crackdown on the flow of information over the Internet. The campaign included putting pressure on foreign companies to comply with state censorship requirements.²¹⁵ Google and AltaVista refused to sign China's "Public Pledge on Self-Discipline for the Chinese Internet Industry," which commits signatories to investigate and block websites based on their content.²¹⁶ Chinese officials apparently fear that search engines such as Google and AltaVista may permit users to circumvent the country's strict censorship regime.²¹⁷

In June 2002, state authorities announced plans to close 150,000 unlicensed Internet cafes nationwide, and passed regulations requiring online publishers to "guarantee the legality" of their content.²¹⁸ Internet cafes are also required to install software capable of blocking designated

214. *Panama Decrees Block to Kill VoIP Service*, SLASHDOT, at <http://yro.slashdot.org/yro/02/04/14/0252201.shtml?tid=95> (Nov. 3, 2002).

215. Letter from Kenneth Roth, Executive Director, Human Rights Watch, to Dr. Eric E. Schmidt, Chief Executive Officer, Google, and to James Burnett, Chief Executive Officer, AltaVista Company (Sept. 7 2002), available at <http://www.hrw.org/press/2002/09/china0907.htm>.

216. See *id.* (noting the resistance of Google and AltaVista to Chinese censorship); Human Rights Watch, *Yahoo! Risks Abusing Rights in China*, at <http://www.hrw.org/press/2002/08/yahoo080902.htm> (Aug. 9, 2002) [hereinafter *Human Rights Watch China*]. The pledge commits signatories to "[r]efrain from producing, posting, or disseminating harmful information that may jeopardize state security and disrupt social stability, contravene laws and regulations and spread superstition and obscenity. Signatories must also "monitor the information publicized by users on websites according to law and remove the harmful information promptly" and "[r]efrain from establishing links to the web sites that contain harmful information, so as to ensure that the content of the network information is lawful and healthy." Letter from Kenneth Roth, Executive Director, Human Rights Watch, to Terry Semel, Chairman and Chief Executive Officer, Yahoo! Inc. (July 30, 2002), available at <http://www.hrw.org/press/2002/08/yahoo-ltr0773002.htm>.

217. *Human Rights Watch China*, *supra* note 216. Yahoo! Inc. eventually agreed to sign the voluntary pledge, prompting outcry among human rights organizations that "Yahoo! will become an agent of Chinese law enforcement [and] switch from an information gateway to an information gatekeeper." *Id.*

218. *Id.*

foreign websites.²¹⁹ Individuals trafficking in content that authorities deem objectionable have been jailed.

ii. Cable Company Control Over Content and Services as a Way to Prevent Streaming Video

Certain use restrictions that cable companies have been permitted to employ, such as limits on broadcast-quality streaming video, may impact the integrity of the transport or application layer. National consumer groups allege that cable operators have gained control of about seventy percent of the broadband market and in the process have succeeded in keeping their networks closed to competing Internet service providers.²²⁰ Although cable companies have agreed to select a few ISPs to sell Internet services to the public, they limit not only the number of ISPs, but also the services they can offer. For example, some cable companies inform the ISPs what services can and cannot be sold (particularly streaming video and end-user generated content and applications); control customer relationships and the ability of non-affiliated ISPs to differentiate themselves; and place independent ISPs in a “price squeeze” situation.²²¹ Dr. Mark Cooper of the Consumer Federation of America asserts that this denial of access and discrimination against independent ISPs has resulted in a substantial market failure: rising prices, poor quality, restriction of choice, and lack of innovation. He states that “[d]ominated by the cable gatekeepers, whose primary goal is to prevent competition for its video monopoly, the high-speed Internet has not seen one significant innovation that exploits its unique qualities.”²²² Whether or not these practices have in fact taken place, these alleged use restrictions constitute clear examples of potential IP layer regulation.

iii. VeriSign’s “SiteFinder” Service: Competitive Innovation or Deceptive Practice?

One other recent development demonstrates what some see as another possible layer-crossing practice—this one operating from inside the architecture of the Internet itself. VeriSign is the officially-sanctioned domain name registrar for all “.com” and “.net” addresses. In mid-

219. *Id.*

220. Statement from Dr. Mark Cooper, Consumer Federation of America, Protecting the Public Interest Against Monopoly Abuse by Cable Companies: Strategies for Local Franchising Authorities in the AT&T Comcast License Transfer Process, to the City of San Francisco, at 2 (May 7, 2002).

221. *Id.*

222. *Id.* at 2-3.

September 2003, VeriSign's "SiteFinder" service began directing mistyped .com and .net e-mail and Web addresses to a different search site. This site was operated jointly by VeriSign and Overture.com, a California-based advertising company that branded itself as a search engine. Shortly thereafter, it was discovered that a so-called "Web bug" was buried in the SiteFinder page, an invisible image file delivering a cookie that expires only after five years.²²³

Some have argued that VeriSign's new SiteFinder service appears to be problematic for a number of reasons. One petition filed with ICANN alleges that VeriSign: (1) broke "technical standards[]" by rewriting the expected error codes to instead point to [VeriSign's] pay-per-click web directory"; (2) broke "technical standards affecting e-mail services, and other [I]nternet systems"; (3) "provid[ed VeriSign] with 20 million eyeballs per day for 'free,' while not paying for the domains they [were] resolving"; (4) "violate[d] trademark rights of domain holders[]" by typosquatting on their .com and .net domains"; and (5) "violate[d] the authoritative nature of [the Domain Name System], turning it instead into a 'best guess' system filled with uncertainty."²²⁴ The petition claims that the Domain Name System ("DNS"), part of the very architecture of the Internet, should not be tainted with advertising and privacy concerns, and that in this particular instance VeriSign should not be allowed to take advantage of its unique role as the domain name registrar for .com and .net addresses.²²⁵

Expressing concern that VeriSign's service was undermining the security and stability of the Internet, the Internet Corporation for Assigned Names and Numbers ("ICANN") requested that VeriSign suspend its new system until security and stability concerns could be properly considered.²²⁶ After VeriSign indicated it would not honor that request,²²⁷ ICANN sent a "formal demand" to VeriSign in early October 2003 asking that it "return the operation of the .com and .net domains to their state before the 15 September changes, pending further technical, operational and legal

223. Deborah Radcliff, *VeriSign's 'SiteFinder' Finds Privacy Hullabaloo*, SecurityFocus, at <http://www.securityfocus.com/news/7009> (Sept. 19, 2003).

224. George Kirikos, *Stop VeriSign DNS Abuse*, Petition to ICANN, at whois.sc/verisign-dns/.

225. *Id.*

226. Advisory, ICANN, Advisory Concerning VeriSign's Deployment of DNS Wildcard Service (Sept. 19, 2003), available at <http://www.icann.org/announcements/advisory-19sep03.htm>.

227. Matt Hicks, *VeriSign Rebuffs ICANN on Redirects*, EWEEK (Sept. 22, 2003), available at <http://www.eweek.com/article2/0,4149,1276359,00.asp>.

evaluation.”²²⁸ VeriSign then agreed voluntarily to temporarily suspend its web navigation service,²²⁹ but has since filed a federal lawsuit against ICANN.²³⁰ Whether one perceives the SiteFinder service as an innovative consumer offering, or a threat to the integrity of the domain name system, there is little doubt that it presents a unique layers-affecting practice warranting careful scrutiny.

2. Regulations that Fail to Respect the Communications System Layers

From the foregoing types of examples, Professor Solum concludes that there should be a strong presumption against layer-violating regulations. This is especially true where such a regulation: (1) affects or has the potential to affect a large number of users (such as the nation’s largest ISPs or backbone operators, an entire nation or nations, or most available TCP ports); or (2) is directed at a lower networking level, such as the TCP layer, the IP layer, or the Physical Layer, due to perceived problems at an upper end level, such as the Content Layer or the Application Layer.²³¹

Professor Solum also addresses briefly the communication systems layers as defined by Professor Benkler. Solum observes that these layers are structured similarly to the Internet network layers but represent different design principles.²³² Nonetheless, the notion of avoiding layer-crossing regulations remains sound in this context as well.

Solum explains that regulation may be targeted at a code layer in order to counter problems at the Content Layer. As one example, he points to the anti-circumvention provision of the Digital Millennium Copyright Act (“DMCA”), which prohibits the manufacturing or distribution of any technology, product, service, or device that circumvents copy protection

228. Letter from Paul Twomey, President and CEO, ICANN, to Russell Lewis, Executive Vice President and General Manager, VeriSign Naming and Directory Services (Oct. 3, 2003), *available at* <http://www.icann.org/correspondence/twomey-to-lewis-03oct03.htm>. For further details and a discussion of the contractual and legal issues associated with this issue, see *ICANN Throws Down the Gauntlet to VeriSign on SiteFinder*, ICANN WATCH, *available at* <http://www.icannwatch.org/article.pl?sid=03/10/03/1350217> (Oct. 3, 2003).

229. Press Release, VeriSign, VeriSign SiteFinder Service Update (Oct. 3, 2003), *available at* http://www.verisign.com/corporate/news/2003/pr_20031003.html.

230. VeriSign claims that ICANN breached its contractual authority and improperly attempted to regulate VeriSign’s business. Press Release, “VeriSign Files Lawsuit Against ICANN” (Feb. 26, 2004), *available at* http://www.verisign.com/corporate/news/2004/pr_20040226.html.

231. Solum & Chung, *supra* note 1, at 101-102.

232. *Id.* at 102.

technology.²³³ This particular provision targets the code that is not part of a network system (the networking layers) due to concerns about issues at the Content Layer (copyright infringement).²³⁴ While such layer-crossing regulations in the communications system layers are structurally similar to layer-violating regulations in the Internet layers (i.e., targeting a lower layer to address an upper layer problem), the communications system layers do not share the general transparency requirement or expectation across the layers.

B. The Layers Principle and Traditional Common Carrier Regulation

This Part, which constitutes the remaining portion of the Article, expands on the layers principles suggested by Professor Solum. The Article proposes adopting two additional corollaries, and then applying those corollaries to a variety of real-life public policy issues involving the regulation of telecommunications and Internet markets. These applications should be considered preliminary in nature, and can be revised or supplemented as part of further development and refinement of a viable horizontal layering framework.

Further, as suggested earlier,²³⁵ the layers principle should not be seen as some sort of absolutist weapon wielded by “layers police.” At its core, the layers approach entails a flexible conceptual framework that provides important insights and possible action plans. The Author’s intention is not to fashion a rigid horizontally-inclined version of the current vertical legal “silos” that already increasingly bedevil Internet and communications markets today. The layers framework also does not necessarily dictate any particular public policy outcomes, but instead should instill a general appreciation for the utility of avoiding unnecessary government intervention and regulation, especially when focused on the wrong network layers. Nor is vertical integration within and among industry players a practice to be condemned under the framework, but rather a material fact to be acknowledged and weighed against legitimate concerns about the adverse impact of significant market concentration.

As Solum notes, the severity of the layers violation is greater when the regulation is attempted at a lower or deeper layer in the layer hierarchy in order to address problems at an upper or higher layer.²³⁶ One can also take the related position, as will be shown, that the severity of the layers

233. *Id.*

234. *Id.*

235. See Part III.A.1.

236. Solum & Chung, *supra* note 1, at 60-61.

violation is greater when nonregulation by a public actor (the government) allows a private actor's behavior at a lower or deeper layer of the network to disrupt transparency and harms innovation and innocent use at an upper or higher layer. This behavior would harm competition by reinforcing abuse of market power or monopoly control over lower layer facilities.

1. Lower Layer Control

The addition of two corollaries to Professor Solum's list, aimed specifically at traditional communications regulators, appears to flow naturally from his first two corollaries. The third corollary concerns the logical and economic link between an entity's control over unique elements of the Physical Layer and its resulting control over higher layers in the protocol stack. The fourth corollary (described in more detail later) builds on that point to recommend carefully targeted regulatory attention to those specific horizontal layers where providers are found to be abusing market power, while leaving the remaining horizontal layers free from unnecessary regulatory constraints.

Corollary Three: The Principle of Leveraging Lower Layer Control

The ability of a private actor to employ market power at the lower Physical Layer allows that same entity to leverage market power into the higher layers that depend on the Physical Layer. In essence, he who controls the lower layers also can control the dependent upper layers.

This reality of leveraged market power from the lower to upper layers ("monopoly leveraging" in antitrust terms) raises the stakes considerably in the current telecommunications regulatory battles over local competition, last-mile regulation, and broadband regulation. In the IP world, the preponderance of innovative applications, services, and content depends on the ability of producers and end users at the "edge" (upper layers) of the network to freely access the lower layers at the network core, including the Physical Layer. If, for example, a Physical Access provider is able to exert disproportionate market power over a last-mile conduit—based on traditional monopoly-derived advantages—that market power then can be leveraged unfairly into the Applications Layer. This outcome can have a detrimental impact on the levels of competition, innovation, and consumer choices otherwise prevalent at that level. Further, given the expanding scope of applications and services that are provided on the Applications Layer, the degree of market power control over the Physical Layer is proportional to the degree of damage that can be caused as a result of inequitable market power control over the higher layers. In short, understanding the basis for employing horizontal regulation is all the more critical in an era of widespread vertical integration, especially where that

integration involves control over essential Physical Access Layer facilities and infrastructure.

While the proposed Network Layers Model framework readily acknowledges the importance of significant market power in formulating and applying government regulation to specific network layers, the framework itself does not mandate any particular test of market power, or dictate how such a test should be applied. Nor is any resulting remedy specified by the layers approach. Indeed, claims about the existence of market power depend largely on the type of test employed, and the empirical evidence presented. One can disagree vehemently about whether or not market power exists in any particular network layer, and what, if any, remedy should apply—that is an economic and factual debate well worth having. However, that dispute should not color judgments about the ultimate utility and viability of utilizing a layers-informed conceptual framework.

Finally, it should be noted that this proposed corollary to the general layers principle does not apply only to the IP-based world of data packets. Given the reality of layered telecommunications networks, with ready technical distinctions between services provided and underlying facilities utilized, many of the concepts and principles associated with layering can be invoked in the analog and circuit-switched world as well. For example, even the traditional voice network employs layered protocols.²³⁷ Data networks also utilize layering models based on different protocols, including Frame Relay, ATM, MPLS, and Ethernet networks.²³⁸

a. Last-Mile Regulation and Competition Policy

Under the proposed third corollary, the need for regulation rests largely on the need to deter and limit the adverse effects of market power, which in turn has resided largely in certain last-mile physical infrastructure and connections with other networks. In the United States, such market power tends to be concentrated in two discrete areas: local communications transport facilities (ILECs and cable companies) and certain exclusive use of radio spectrum frequencies (wireless service providers, and broadcast radio and television networks and station operators). Utilization of the

237. See, e.g., Sicker and Mindel, *supra* note 92, at 77 n.32; McTaggart, *supra* note 69, at 5.

238. See, e.g., Defense Information Systems Agency, The Commercial Telecommunications Standards: Standards and Specifications for ATM http://comm.disa.mil/atm/atm_pr.html (last updated Aug. 25, 2003) (showing layers of ATM protocol); Presentation: Steve Wood et al., *RPR Physical Layer*, at http://www.ieee802.org/17/documents/presentations/jan2002/hp_phy_02.pdf (last visited Apr. 1, 2004) (showing layers of Ethernet protocol).

horizontal layers framework allows policymakers to focus on retaining wholesale access regulation at the Physical Access Layer, at least where historic scarcity of public resources (radio and television spectrum) or monopoly-derived advantages (local telephony and cable plant) still remain in place.

Of course, the current market structure, while long persisting, is but a snapshot in time. Critical market and technology changes, such as the increased availability of robust intramodal and intermodal platform alternatives, and the prevalent use of spread-spectrum modulation techniques, eventually can help remove these non-market-based advantages. Thus, by focusing on the pertinent network layers, and recognizing the primary basis for regulation—alleviating market concentration in certain network facilities and resources—policymakers can devise the appropriate pro-competitive framework that in turn can lead to reducing or even eliminating the need for any such regulation in the future.

b. Local Competition and Unbundled Network Elements

The validity of the layers principle, and the proposed third corollary above, only highlights the need to create as much competition as possible at the last-mile network level. Indeed, given the enormous stakes involved at the higher Applications and Content Layers, U.S. regulators have a duty to engender competition both between different physical platforms (intermodal) and within those particular platforms that display market power (intramodal). Section 251(c) of the Telecommunications Act of 1996, which requires the ILECs to provide unbundled network elements (“UNEs”), can be an important legal mechanism in service of the layers principle.²³⁹ In particular, UNEs can help foster intramodal competition for voice service within the entrenched local exchange network, both in terms of near-term UNE platform (“UNE-P”) competition and longer-term, facilities-based competition.

As mentioned previously, the concept of a UNE is an interesting blend of horizontal and vertical thinking. Horizontal framing can help unlock some of the public policy confusion surrounding the appropriate use of UNEs to foster local competition. For example, application of a horizontal layers framework helps raise significant doubts about several factual conclusions adopted by the FCC in its recent *UNE Triennial Review Order*.²⁴⁰ There the FCC, among other things, created a regulatory

239. 47 U.S.C. § 251(c)(3) (2000).

240. Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange

distinction between a narrowband, circuit-switched environment (more precisely, a 64-kilobits per second transmission path established via the Time Division Multiplexing ("TDM") of interleaved voice signals), and broadband "packet-switching capability," for purposes of defining what UNEs should be provided to CLECs.²⁴¹ The FCC further devised a regulatory distinction between mass market fiber-based local loops and copper-based local loops.²⁴² In both cases, the Commission appears to believe (without any supporting empirical evidence) that the particular access medium employed at the various layers is a more salient factor in determining which UNEs to unbundle, than the market power and other characteristics of the network provider that employs it.²⁴³

2. Focused Regulatory Attention

Many people unfamiliar with the role of regulation have an almost instinctive negative reaction without fully understanding or appreciating its utility. As Sicker writes, "regulations are applied to promote certain desirable goals, such as ubiquity of service, efficiency of commerce, public safety, national security, innovation, and education. The problem is that regulation is a difficult balancing act, where the goals may stand in opposition to each other."²⁴⁴

When cast in terms of the horizontal layers framework, the traditional telecommunications regulator's chief objective is to prevent the exercise of market power at lower network layers from impinging upon the otherwise robustly competitive and innovative upper service layers, and to limit or eliminate unnecessary regulation of upper layers. In this way, policymakers can help foster a "deregulatory commons," where innovation can flourish at all levels of the network. Thus, the fourth proposed corollary calls on regulators to employ their regulatory tools and attention only where necessary, and no further.

Corollary Four: The Principle of Focusing Regulatory Attention

Regulators should target necessary legal and regulatory resources only to those specific horizontal layers where market power resides, or where regulatory attention otherwise is necessary in the public interest, and

Carriers, *Report and Order on Remand and Further Notice of Proposed Rulemaking*, CC Docket No. 01-338 (Aug. 21, 2003) [hereinafter *UNE Triennial Review Order*].

241. *Id.* at paras. 213, 293.

242. *Id.* at paras. 211-213.

243. *See generally id.* at paras. 234-297.

244. Sicker, *Layered Policy Model*, *supra* note 95, at 4.

leave the remaining horizontal layers free from unnecessary regulatory constraints.²⁴⁵

This deregulatory corollary is well-supported in the economic literature. As just one example, Professor Reza Dibadj of the University of Miami has written about the proper way to exert regulatory authority.²⁴⁶ Professor Dibadj's central thesis is that regulators must move away from industry definitions based on historical distinctions, and towards a regulatory framework based on economics, with a goal of maximizing both efficiency and equity.²⁴⁷ Under this approach, the decisionmaker must: (1) identify the scarce resource (or "bottleneck" input) in question; (2) determine whether a market participant is exerting monopoly power over the input to the detriment of competition or public policy; and (3) regulate the resource based on empirical economic models. The fundamental idea is to confine regulation to "bottleneck inputs" (portions of existing networks that are vestiges of monopoly or prohibitively expensive for new entrants to build), and let competition flourish for the services and applications that utilize those networks.²⁴⁸ Simple economics dictates that competitive entities be allowed to access these inputs. As Dibadj succinctly puts it, "without access to these bottlenecks, competition is a farce."²⁴⁹

In a similar vein, James Lawrence proposes that federal policymakers consider developing a new, more forward-looking regulatory philosophy focused on regulating access to telecommunications networks, rather than telecommunications services themselves.²⁵⁰ In order to promote the evolution of a national, next-generation broadband communications infrastructure in a healthy competitive market, Lawrence suggests drawing a new regulatory boundary that focuses on the classic monopoly dilemma—network access—separate from the service business.²⁵¹ He

245. As Kevin Werbach recently told Congress, "Competitive issues of market power and interconnection primarily concern the physical layer. If the physical layer is open, there is little or no need to regulate what runs on top." Written Testimony of Kevin Werbach, Founder, Supernova Group LLC, before the Senate Committee on Commerce, Science, and Transportation, Voice over Internet Protocol Hearing, Feb. 24, 2004, at 3.

247. See Reza Dibadj, *Toward Meaningful Cable Competition: Getting Beyond the Monopoly Morass*, 7 N.Y.U. J. LEGIS. & PUB. POL'Y 291-301 (2002) (suggesting that policymakers should define the technology, isolate the associated scarce resource, identify any actor with monopoly control, and regulate if necessary in a manner consistent with the public interest).

247. *Id.* See Reza Dibadj, *Deregulation: A Tragedy in Three Acts*, THE WASHINGTON POST, Sept. 13, 2003, at A21.

248. *Id.*

249. *Id.*

250. James Lawrence, Stratecast Partners, "Regulatory Reform Should Focus on Access," SPIE 2004 #15, Apr. 9, 2004, at 1.

251. *Id.* at 5-6.

points specifically to the commercial use by wireless and wireline networks of common public resources (radio frequencies, rights-of-way, and roads) as the rationale for regulating all forms of telecommunications access to better protect and enhance the public good.²⁵²

a. The Basic/Enhanced Dichotomy

As explained earlier, over thirty years ago the FCC first set out on a path that led to devising and adopting a useful formula for separating out the basic telecommunications services that should remain subject to common carriage regulation, and those enhanced features and functionalities that should remain outside such regulation. While the concept itself remains sound,²⁵³ it is obvious from continuing debates over the proper classification of broadband and VoIP services that the purported “bright-line” that once separated these two classes of service increasingly is becoming blurred and subject to confusion.

The horizontal layers framework offers a significantly more refined, engineering-based update to the FCC’s basic/enhanced dichotomy (which is mirrored in the 1996 Act’s telecommunications service/information service definitions). In general, the FCC should be receptive to finding better empirical footing in the actual network and code topology employed in the telecommunications and Internet sectors, rather than continuing to rely on the relatively rough-hewn concepts employed more or less unchanged for several decades. In addition, the basic/enhanced distinction was born within the confines of the telephone network and telephony regulation, and to date has not been expressly extended to other types of transmission networks. By incorporating the horizontal layers framework, the FCC can expand the scope of the concept beyond telephony to all types of two-way networks, regardless of the particular technologies used

252. *Id.*

253. See e.g., Cannon, *supra* note 13, at 196-98.

[T]he FCC implicitly identified that within the different layers are different markets and different regulatory concerns: [t]he physical network (layers 1 and 2 of the OSI reference model) is “basic services” provisioned by telephone carriers regulated under Title II[;] [t]he logical network (layers 3 and 4) is TCP/IP or Internet access provisioned by ISPs, directly and intentionally benefiting from the [Computer Inquiry] safeguards[;] [and the] services, applications, and content provisioned by [many providers], all generally removed from communication regulation.

...

This layered approach to the [Computer Inquiries] means clear segregation between basic and enhanced services. Basic is never enhanced; enhanced is never basic. . . . Identifying something as an enhanced service does not alter the underlying transmission capacity as basic.

Id.

(copper, fiber, coaxial cable, radio signals, power lines) to construct and operate them.

The ILECs frequently make the argument that they should be freed from regulation on their data services because these markets are competitive. Should robust competition prevail in the consumer broadband access market under any respected antitrust metric, the ILECs would have a cogent argument. Such is not the case, however, at least at the present time. Further, Kevin Werbach notes that this analysis misses the importance of interfaces between layers.²⁵⁴ Under the layered model, ILEC data services should be deregulated if and when the FCC can assure itself that the ILECs will not be able to leverage lower-level control into other layers. This could happen in one of two ways: if the physical and logical infrastructure layers in the relevant markets were sufficiently competitive, or if the FCC or Congress adopt rules that prevent ILECs from closing the interfaces between layers or otherwise constraining higher-level competition. To Werbach, “the *Computer II* structural separation requirements and the *Computer III* non-structural safeguards are in effect such rules.”²⁵⁵

b. Regulation of Broadband Access Platforms

The layers principle also assists telecommunications policymakers in assessing the viability of arguments raised with regard to whether and how to regulate broadband access platforms such as DSL and cable modem services. For example, several commentators have written about how proposals to allow the incumbent cable and telephone companies to establish “closed” broadband networks, thereby denying access to independent ISPs, are contrary to the “end-to-end” engineering principle. Kevin Werbach, for example, says that the layers model, more than reframing existing debates, brings to the surface important issues that tend to become lost under the existing regulatory model:

Perhaps the most significant of these is the question of interfaces between layers. A key element of the Internet model is that these interfaces are open. This allows competitors to circumvent a bottleneck at one layer by deploying services over another layer, and prevents companies that have control of lower-level services from prejudicing or precluding certain services at higher layers. Cable open access can thus be understood as a debate over whether cable operators can use their control of the physical layer (cable distribution plant) to restrict choice and competition at the three higher levels. . . . [O]pen interfaces are increasingly critical to an innovative, competitive market.²⁵⁶

254. Werbach, *A Layered Model*, *supra* note 2, at 65-66.

255. *Id.* at 67.

256. *Id.* at 65-66.

Clark and Blumenthal opine that the "open access" debate is not just about choice in ISPs; rather, if access to alternative ISPs is constrained or blocked, user access to content would be similarly compromised. There is a presumed linkage between lack of choice in access to the Internet and a loss of the open, end-to-end nature of the Internet.²⁵⁷ Bar and Sandvig urge the adoption of a new policy bargain between "control" and "access," that allows the non-discriminatory ability to design the architecture of a communication platform, not only for those who own and control network infrastructures, but also for end users or third parties.²⁵⁸ Safeguarding this ability to design promotes at least two policy interests: fairness and innovation promotion.²⁵⁹

The layers approach also supports the current definitional scheme employed by the FCC for DSL-based broadband services. At present, the FCC views the DSL transmission component as a telecommunications service, while the Internet access typically bundled with ("riding on top of") that platform is an unregulated information service.²⁶⁰ However, in its wireline broadband proceeding the FCC has proposed doing away with this distinction. Instead, the FCC would treat the entire service as one unregulated information service, with no underlying DSL transmission component.²⁶¹ The upshot of this proposed reclassification is that independent ISPs no longer would have access to DSL inputs, as mandated by the nondiscrimination rules first fashioned in the *Computer Inquiry* docket.

257. Clark & Blumenthal, *supra* note 30, at 19. Others agree about the negative consequences of allowing the cable company to bundle ISP service and access facilities, and that "[g]iving such power to discriminate to the owner of the actual network infrastructure may be viewed as inconsistent with the end-to-end philosophy of the Internet." Shah et al., *supra* note 26, at 5 n.9.

258. Bar & Sandvig, *supra* note 2, at 22.
259 *Id.*

260. See Deployment of Wireline Services Offering Advanced Telecommunications Capability, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, 13 F.C.C.R. 24011, paras. 35-36, 13 Comm. Reg. (P & F) 1 (1998) (holding that DSL constitutes telecommunications service when offered to the public directly or on a stand-alone basis).

261. Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, *Notice of Proposed Rulemaking*, 17 F.C.C.R. 3019 (2002) [hereinafter *Broadband Framework NPRM*]. SBC has proposed that the FCC recognize a similar conflation of IP services and applications with the underlying broadband platform, and forbear from imposing common carrier regulation on any aspect of this layered bundle. See Petition of SBC Communications, Inc. for Forbearance from the Application of Title II Common Carrier Regulation to IP Platform Services, WC Docket No. 04-29, available at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516086662 (filed Feb. 5, 2004).

A careful understanding of the horizontal layers framework exposes the technical fallacy of the FCC's proposal. In short, the FCC's broadband redefinition would violate the layers concept by collapsing the various layers into a single information service defined by its upper layers, and allowing the Physical Access Layer (i.e., DSL) to control or discriminate against those layers. Through an understanding of the layers principle and its corollaries, the Commission should be led to abandon the mistaken conflation of upper-level Application Layer services such as Internet access with lower-level Physical Access Layer services such as broadband access platforms, and instead retain its original correct classification of DSL-based transport as a telecommunications service (see Figure 8 below).

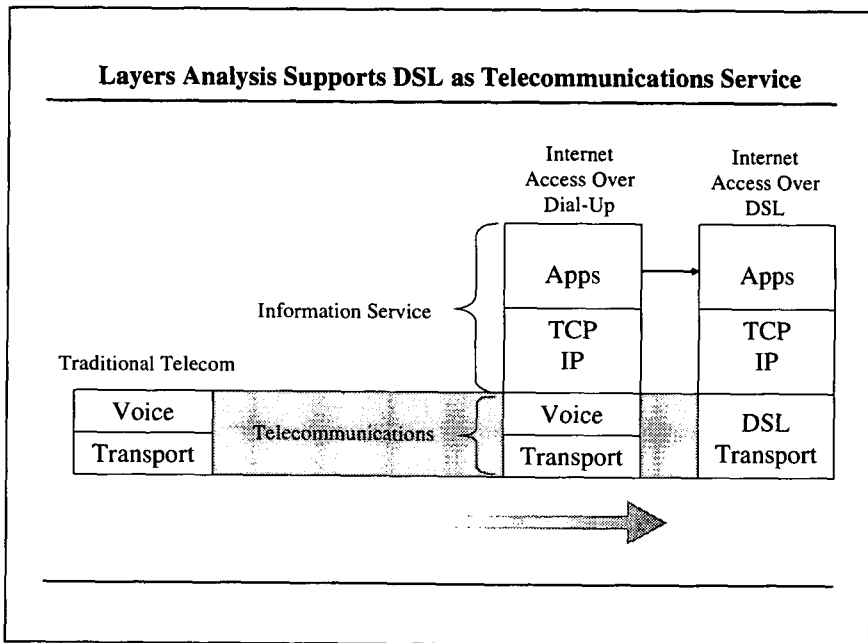


Figure 8

Others have picked up on this fatal flaw in the FCC's tentative thinking. Vint Cerf cautions that "this [DSL] transmission path should not in any way be confused with one of the more common applications of DSL: Internet access."²⁶² Rob Frieden observes that the unclear legal status of broadband service evidences "significant confusion in determining the

262. Cerf Letter to Evans/Powell, *supra* note 16, at 2.

length and breadth of what constitutes a telecommunications service, particularly when coupled with either a cable service or an information service.”²⁶³ Frieden sees dubious motivations at work, believing that the FCC seeks to eliminate the application of longstanding common carrier regulatory burdens on telephone companies when they bundle or blend broadband telecommunications services with information services. In order to carry out its claimed “functional” approach, however, the Commission “has to subordinate the telecommunications transport function relative to the information services provided and also to dismiss the previously recognized legal, marketplace and technological differences between the two carriers.”²⁶⁴ Frieden states that:

[I]n its chosen deregulatory quest, the FCC has engaged in a flawed and disingenuous strategy to combine previously different regulatory models based on new functional similarity. Suddenly a telecommunications service can become stripped of its common carrier regulatory triggers if and when the FCC chooses to emphasize the content or enhancements carried via the telecommunications conduit.²⁶⁵

The FCC’s proposed policy also could unleash some enormously anticompetitive consequences. Again, Frieden observes that:

Rather than narrow a regulatory loophole, the FCC has created an incredibly larger one . . . [that appears] to offer telecommunications service providers the ability to free themselves of any and all common carrier burdens that otherwise would apply to broadband telecommunications service simply by characterizing these offerings as information services.

. . .

Much of this ad hoc rethinking of how definitions apply stems from the vertical regulatory models the Commission has erected and seeks to maintain. While new technologies do force regulatory agencies to determine into which categories innovative new services fit, the predominant trigger for trouble lies in the Commission’s perceived need to make all or nothing assignments . . .²⁶⁶

263. Frieden, *supra* note 74, at 229.

264. *Id.* at 230.

265. *Id.*

266. *Id.* at 234, 236; *see also id.* at 241 (“The Commission cannot achieve the twin goal of sustaining service classifications and the vertical regulatory regimes while also creating novel ways to ignore the telecommunication services aspect of a convergent, blended, and hybrid service that clearly has a horizontal layer of telecommunications delivered to consumers. . . . Instead the Commission pulls telecommunications capabilities out from the telecommunications service classification, thereby achieving deregulation without having to undertake the fact-finding and record-generating to support specific . . . deregulation.”); Katz, *supra* note 113, at 35-36 (“Manifestly, a [broadband] policy that did not break out the telecommunications component [from the vertically bundled package of information

Sicker also notes the hazy thought process behind the FCC's stated desire to create broadband deployment incentives for the incumbent DSL facilities providers. In particular:

Some believe that the only way to create an incentive for broadband deployment is vertical integration. We view this as an invitation for abuse. While we believe that physical network providers need a return on investment, we do not believe that this should come at the expense of eliminating competition in higher layer[s] to create that incentive. There is no just reason to destroy the competitive application market that has developed in the name of broadband deployment.²⁶⁷

Vint Cerf has expressed puzzlement at the idea that the ILECs require additional incentives to deploy DSL-based broadband facilities. In addition to the fact that such facilities largely are available now, he writes, "competition is its own incentive."²⁶⁸ In the supposed battle between the ILECs and cable companies, "no company can afford to sit on the sidelines and watch its competitors take the market. To the extent the ILECs believe they can do so, of course, it is yet another sign that they have market power in providing broadband services."²⁶⁹

Werbach also demonstrates the flawed premise behind the call by some for "regulatory parity," which amounts to adopting the same legal classification and treatment for DSL-based broadband and for cable modem-based broadband platforms:

The layered model makes many of the conflicts that today bedevil regulators more tractable. For example, the inconsistency between the treatment of DSL, which is subject to federal open interconnection requirements (under Title II), and cable modem services, which currently are not, turns out to be a figment of the [vertical] model. Both cases involve the possibility that service providers with control over the physical and logical layers of networks will extend that control into applications and content. Looking at the issue in this way doesn't compel one outcome or the other. It may be that the FCC concludes open access is the right policy result, but that in the cable situation market forces will be sufficient to arrive at that result. The important shift is that the focus is now on the key policy issue at stake, rather than the almost accidental context that defines the issue today.²⁷⁰

Moreover, contrary to ILEC claims, the advent of DSL technology constitutes only an evolution of the Physical Access Layer, not a top-to-bottom vertical revolution. DSL utilizes existing physical links already

services] would fail to recognize de-lamination and would be subject to gaming and raising the possibility of competitive distortions.").

267. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 14.

268. Cerf Letter to Evans/Powell, *supra* note 16, at 3.

269. *Id.*

270. Werbach, *A Layered Model*, *supra* note 2, at 64-65.

connected to most homes: the twisted-pair copper telephone lines. Undoubtedly the higher modem speeds, "always on" feature, and ability to simultaneously use the telephone and the Internet are superior aspects of DSL vis-à-vis ISDN or traditional narrowband dial-up service. Nonetheless, in every other way the DSL service provided to consumers (the bundled retail marriage of Internet access and DSL platform) represents merely a network upgrade from the point of view of the Physical Layer. From the Internet's perspective, "broadband" and "narrowband" (however defined) essentially are one and the same. As Vint Cerf puts it, "DSL technology is merely the latest in a continuing stream of incremental improvements to the use of the existing telephone network."²⁷¹

In addition, the horizontal layers framework shows the deep nature of ISPs' dependency on DSL, at least for the present time. Cerf and others have shown that there are no viable near-term alternatives to the two dominant broadband access platforms of cable modem service and DSL service.²⁷² At the same time, the very existence and flourishing of the Applications Layer obviously relies on the lower Physical Access Layer—there is no such thing as a stand-alone application without the means of conveying that application between different points in a network. As a result, the failure to appropriately regulate last-mile broadband facilities will allow those providers to extend their market power into the higher layers, including applications and content. This particular form of vertical integration could cause undue harm to the Internet.

At the same time, the layers principle also offers a well-founded basis for disproving the BOCs' claim that Internet access and DSL constitute one unified entity that would be difficult and costly to untangle, somehow resulting in a loss of innovation. Certainly Qwest's recent announcement of a "Naked DSL" offering—unbundling the voice service and the Internet access component from the DSL transmission platform—demonstrates that at least one BOC has little difficulty in disaggregating these piece-parts of the retail high-speed service.²⁷³ This is hardly surprising, as the broadband

271. Cerf Letter to Evans/Powell, *supra* note 16, at 2.

272. See *id.* at 3 ("Physics gets in the way of the supposed competition" in providing broadband transmission services. As a result, "[a]t best, the residential market is a duopoly—and in the worst case, consumers have only one choice or, in poorly served areas, no choice at all."); Vinton G. Cerf, *Broadband Policy and Delivery Options*, International Engineering Consortium, at 3 (brochure containing Cerf's June 3, 2002 keynote address at SUPERCOMM 2002) [hereinafter Cerf IEC Paper]. Different broadband platforms "are indeed technologically competitive," but "whether they effectively compete is another story." *Id.*

273. Alex Salkever, *Will Naked DSL Chill the Cable Guys?*, BUSINESS WEEK ONLINE, at www.businessweek.com/technology/content/feb2004/tc20040227_8296_tc047.htm (Feb. 27, 2004).

networks naturally have been constructed around these very separate, and severable, layers. Additionally, as ISPs have argued repeatedly in the FCC's wireline broadband proceeding, innovation at the "edge" of the network is the hallmark of the Internet, and the FCC's proposed redefinition of DSL would wreak havoc on that innovation.²⁷⁴ Professor Benkler points out that "[c]ompeting ISPs can compete [with cable modem operators] precisely by offering users different types of capacities over the same system. These ISPs are the primary potential separating agent between the ownership of the carriage medium and control of the content."²⁷⁵ Without that separation, the underlying provider can seize control over the upper layers as well, to the detriment of innovation and other consumer welfare benefits. Indeed, Professor Solum remarks that "[t]he nature of ISP service is not inherently fixed, and they can and do provide [a] wide range of diverse services including audio and video content. In short, the independent ISPs are engines for innovation in markets we do not yet imagine."²⁷⁶

Professor Solum also discusses the danger of vertical integration in the cable modem services context, where

the same company sells products at the Content [L]ayer as a media company, owns the cable wires at the Physical [L]ayer as a cable company, and has the ability to impose controls at the code layers as an ISP. Such vertical integration of functions across the layers may raise anti-competit[ion] and [antitrust] concerns, especially when considering the cable companies' . . . monopolies in the high-speed Internet access market—perhaps the most important segment of the market because that is where the future lies.²⁷⁷

The same lesson applies to the ILECs' DSL offerings. For example, it is not in the ILECs' interest to allow end users to utilize VoIP services and applications, which would tend to cannibalize the ILECs' long-distance and exchange-access services. In these instances, and others, innovation clashes with legacy revenue streams, and the latter wins out if the underlying platform provider is allowed to control what the customer can and cannot do.²⁷⁸

274. See generally, THE BROADNET ALLIANCE, THE IMPORTANCE OF A BROAD NET: THE SIGNIFICANT ROLE OF ONLINE SERVICE PROVIDERS IN THE DEVELOPMENT AND SUCCESS OF THE INFORMATION AGE (2002), available at http://www.broadnetalliance.org/what_were_doing_fcc.html.

275. Benkler, *supra* note 43, at 575.

276. Solum and Chung, *supra* note 1, at 95.

277. *Id.*

278. See *Turner Brdcast. Sys., Inc. v. FCC*, 512 U.S. 622, 657 (1994) (finding that the First Amendment authorizes the U.S. Government to take steps "to ensure that private

In this particular situation, policymakers generally have two choices: restrict (quarantine) the upstream dominant firm, or regulate that firm to some degree (which requires regulation of wholesale prices and quality of access). While a restriction on vertical integration would more directly address the market dominance concerns, appropriate regulation designed to facilitate nondiscriminatory access at various layers appears sufficient in most cases to largely negate those concerns. Many forms of vertical integration can bring efficiency benefits to the marketplace, and a relatively small likelihood of harming competition. Thus, quarantine of the dominant firm should be viewed only as a measure of last resort, and other regulatory options should be considered where necessary to protect competition and innovation in adjoining network layers.

For example, Farrell and Weiser explain that even a vertically-integrated monopolist may have natural incentives to voluntarily "provide access to its [dominant] platform when it is efficient to do so, and to deny such access only when access is inefficient."²⁷⁹ At the same time, however, Farrell and Weiser identify no fewer than eight separate exceptions to this economic concept of internalizing complementary externalities ("ICE"); many of these exceptions provide compelling reasons for why a broadband platform provider with market power might inefficiently close its platform to entities in the applications market.²⁸⁰ In a similar fashion, layers analysis helps reveal those instances where powerful firms at one level in the communications network should not be allowed to leverage that power unfairly into adjacent levels, causing significant damage to competition and innovation. Thus, at least in the current market environment, the provisioning of broadband access platforms by the ILECs and cable companies merits careful regulatory scrutiny. At minimum, the FCC should retain (in the case of DSL) and consider imposing (in the case of cable

interests not restrict, through physical control of a critical pathway of communications, the free flow of information and ideas.").

279. Farrell & Weiser, *supra* note 160, at 4.

280. *Id.* at 17-37. These failures in ICE as a central organizing principle include: (1) "Baxter's Law" (monopoly platform is subject to competition but applications market is not); (2) price discrimination in a bundled services environment; (3) potential competition in complementary markets; (4) bargaining problems between gatekeeper platform monopolies and independent innovators; (5) incompetent incumbents failing to understand ICE; (6) "option value" (fear of inability to close platform at later date); (7) regulatory strategy considerations (creating unfavorable precedent for related markets); and (8) incomplete complementarity (leading to attempted monopolization of the applications market). *Id.* at 21-37. Farrell and Weiser see at least three coherent paths for regulators to consider, including a categorical protection of modularity, in response to the possible need to regulate vertical relations. *Id.* at 37-45.

modem service) a wholesale access requirement in the face of evidence of demonstrable and persistent market power.²⁸¹

Finally, Tim Wu and Lawrence Lessig also see a fruitful connection to innovation theory:

There is a direct link between these evolutionary theories of innovation and the market for broadband Internet applications. The Internet has long functioned as a figurative 'platform' for a fierce and highly innovative competition between applications. . . . This evolutionary process was directly facilitated by the early Internet's [end-to-end] design. . . . The architecture thus removed the possibility that network owners, for competitive or strategic reasons, would interfere with new applications.²⁸²

In sum, it is important to allow effective "vertical competition" in the broadband space, primarily through engendering robust intermodal and intramodal competition at the Physical Access Layer. The Internet market generally has been characterized by massive shifts in the competitive center, with competition coming from other layers (i.e., hardware companies versus operating system companies versus browser companies versus open source platform companies). Vint Cerf sees no logical reason to adopt the FCC's recommended view that "open nondiscriminatory telecommunications platforms no longer serve the public interest when they are used to provide so-called broadband services."²⁸³ As Professor Solum notes, the "vertical integration of content, ISP, and access market threatens to stifle the innovative future of the Internet by eliminating this strategic competitive factor in the critically important residential broadband market."²⁸⁴ Where emerging technologies or competitive entry fail to create the proper conditions to eliminate market concentration in the consumer broadband space, policymakers must not hesitate to employ appropriate

281. FCC Chairman Powell recently acknowledged the significant potential harms from restrictions imposed by vertically-integrated broadband platform providers on their end users, but he remains unconvinced that the concerns are anything but speculative at this point. Remarks of Michael K. Powell, Chairman, FCC, at the Silicon Flatirons Symposium on "The Digital Broadband Migration," University of Colorado School of Law, Boulder, Colorado 4 (Feb. 8, 2004). As an alternative to regulatory solutions, he has challenged the broadband network industry to voluntarily preserve four "Internet Freedoms" for end users: freedom to access content, freedom to use applications, freedom to attach personal devices, and freedom to obtain service plan information. *Id.* at 5-6. Obviously, it remains to be seen whether the Chairman's preferred reliance on public exhortations, rather than regulatory mandates, will successfully deter the improper exercise of market power by the predominant broadband platform providers.

282. Wu & Lessig Letter, *supra* note 167, at 5-6.

283. Cerf IEC Paper, *supra* note 272, at 4.

284. Solum & Chung, *supra* note 1, at 95.

measures, such as a wholesale access requirement, to protect competition and innovation at all network layers.

c. IP Communications: VoIP and Other Applications

Providers of so-called VoIP services and other IP-enabled applications and services, such as Vonage, 8x8, VoicePulse, and Phonom, have argued against common carrier-style federal and state regulation of competitive VoIP services. The typical argument under legacy legal analysis is that VoIP is an information service that by definition cannot be classified and treated as a telecommunications service.²⁸⁵ This particular view faces stiff political challenges on several fronts. State regulators already have begun to insist that providers of VoIP services look just like ordinary telephone companies, and so the providers must seek state approval as common carriers to provide such services to the public.²⁸⁶ With that carrier certification would come other public interest obligations, such as the payment of federal and state universal service charges, the provision of 911 emergency services, and submission to wiretapping requirements under CALEA and related statutes. In a similar vein, the incumbent LECs have argued that providers of VoIP service must comply with many existing carrier regulations, particularly with regard to the payment of intercarrier compensation (interstate carrier access charges) to the ILECs.²⁸⁷ At this juncture it is unclear whether and when this legal issue ultimately will be resolved at the FCC or elsewhere.²⁸⁸

285. See, e.g., Joint Comments of MCI and CompTel, WC Docket No. 03-211, at 5-13 (Oct. 27, 2003), available at http://www.comptelascet.org/news/recent-news/vonage_oct27_2003.pdf (arguing that Vonage's VoIP service is an interstate information service under pertinent law and regulations).

286. Complaint of the Minn. Dep't of Commerce Against Vonage Holding Corp., Docket No. P-6214/C-03-108, 2003 Minn. PUC LEXIS 94 (Minn. Pub. Utils. Comm'n, Sept. 11, 2003) (concluding that the Commission possesses jurisdiction over Vonage "as a company providing telephone service in Minnesota," and ordering Vonage to acquire a carrier certification and comply with 911 service and fee requirements), *overruled by* Vonage Holdings Corp. v. Minn. Pub. Utils. Comm'n, 290 F. Supp 2d 993 (D. Minn. 2003) (holding that the PUC decision is contrary to federal law and issuing a permanent injunction against its enforcement).

287. See, e.g., Comments of Verizon, WC Docket No. 03-211 at 13-15 (Oct. 27, 2003) (advocating that Vonage provides a telecommunications service and must pay interstate access charges); Comments of SBC Communications, Inc., WC Docket No. 03-211, at 8 (Oct. 27, 2003) (arguing that all IP telephony services are subject to paying terminating interstate access charges).

288. The FCC has initiated a new rulemaking proceeding to examine the various legal and regulatory issues surrounding VoIP and other "IP-enabled applications and services." See *IP-Enabled Services NPRM*, *supra* note 99, para. 1. Citing the work of authors such as Kevin Werbach, Robert Entman, Michael Katz, and Douglas Sicker, the NPRM suggests as

Moreover, when the FCC first was compelled to take a look at the regulatory classification of VoIP in 1998, it fell back on familiar territory: the notion that one should regulate based on what type of retail service one can discern.²⁸⁹ Employing its so-called “functional approach,” the FCC tentatively divided up the world of “IP telephony” services into at least two discrete buckets: “phone-to-phone” and “computer-to-computer.”²⁹⁰ Based on four non-dispositive factors, the Commission indicated that certain types of phone-to-phone service lack the characteristic of an “information service.”²⁹¹ However, the FCC declined “to make any definitive pronouncements in the absence of a more complete record”²⁹²

As FCC Chairman Powell already recognizes, the federal government desperately needs a new theory to encompass all forms of IP-based services and applications. The layers approach offers a compelling way to frame the issue. In the coming IP world, voice service becomes just another application—in this case, audio bits—that “ride on top of” the IP protocol. So, too, data bits and video bits and any other bits would be treated from an engineering perspective as any other element of the Applications Layer. There no longer is any necessary tie between the service being offered—two-way interactive voice service—and the underlying network used to provide the service—IP transport (see Figure 9 below).²⁹³ In point of fact, regulation of the upper layer application simply makes no sense where there is no longer an automatic correlation to a fixed lower layer platform technology.

one option that the Commission could adopt a layers-informed regulatory framework. *Id.* para 37.

289. See *FCC Report to Congress*, *supra* note 61, at para. 86 (noting that “the classification of a service under the 1996 Act depends on the functional nature of the end-user offering.”).

290. *Id.* at para. 87-88.

291. *Id.* at para. 89. The four non-dispositive factors are: the provider holds itself out as providing voice telephony service, the provider does not require the customer to use different CPE, the provider allows the customer to call ordinary telephone numbers, and the provider transmits customer information without net change in form or content. *Id.* at para 88.

292. *Id.* at 90.

293. See Ray Gifford, President, The Progress & Freedom Foundation, VoIP—CREATIVE DESTRUCTION OF REGULATION, available at <http://www.pff.org/issues/communications/testimony/1> (last visited Apr. 3, 2003). This presentation provided the basis for Figure 9, and the general format for Figure 8.

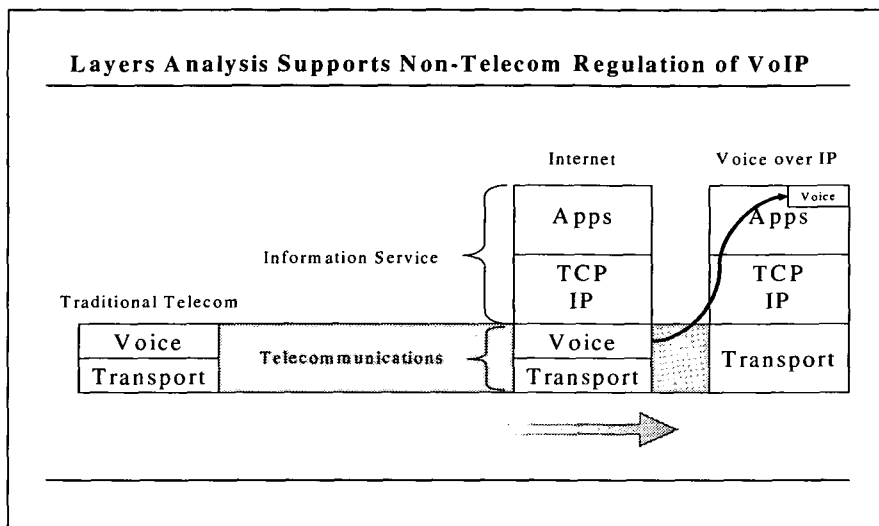


Figure 9

Moreover, in a market where any and all such applications are offered on a competitive basis, there simply is no need for common carrier-style regulation. Employing the new Corollary Four (the principle of focused regulatory attention) suggested earlier, any lingering concerns about the need for government oversight of the retail voice services market largely are negated when those services are shifted to an IP platform. While tailored regulation of last-mile Physical Access Layer facilities that carry the VoIP services may continue to be necessary in the presence of demonstrable market power, such pro-competition regulation need not and should not extend upward to the Application Layer.

Of course, VoIP is not a monolith, and not every mingling of voice service with IP automatically constitutes an Application Layer functionality. Douglas Sicker agrees that voice can be an application, and separate from the network on which it operates, but he acknowledges that voice services running over packet networks bring up many difficult issues.²⁹⁴ Policymakers initially must consider distinctions between (1) voice services running over the Internet and those services running over internet protocols, (2) self-provisioned services and those obtained from a service provider, (3) whether there is a "holding out of a service," and (4) whether IP-based services should be viewed as in their infancy, and therefore should be free from burdensome regulations. Fundamentally, however, because voice fast is becoming an application, and not

294. See Sicker, Further Defining a Layered Model, *supra* note 2, at 22.

coterminous with the network on which it operates, voice as a service generally “should not be subject to the same regulatory conditions as the physical network.”²⁹⁵

d. Other Key Public Policy Issues

The layered model invites closer scrutiny of other public policy issues as well. While in some cases the framework may not suggest ready answers, it does provide policymakers with a unique and helpful vantage point from which to identify and assess the potential options.

i. Jurisdiction

Determining whether and how a regulatory authority can claim jurisdiction over one or more layers of an IP-based service offering is an incredibly thorny issue. McTaggart proclaims that it is not possible to declare who has jurisdiction over the Internet because “[d]ifferent elements of the Internet’s four layers are subject to widely divergent jurisdictional patterns, and many issues cross over both jurisdictions [and] layers.”²⁹⁶ Katz predicts that jurisdictional analysis is very likely to become even more of a mess if policymakers continue to try to determine the “location” of services in the Applications Layer. In fact, it is far from evident that an application is usefully viewed as having a location. A major consequence of this development is that all layers will increasingly be regulated at the federal level. Under another plausible scenario, one could argue for state or local regulation of aspects of the Physical Access Layer, based on the geographic location of the facilities and the effects on local markets.²⁹⁷

Nakahata looks at the federal/state/local jurisdiction issue from a more legalistic perspective:

Congress must make a substantial change in the current division of labor between the federal government, states, and local governments in regulating information platforms. This, too, should look at functionally, recognizing that the federal government is generally not as good at applying regulatory standards to local situations or conducting detailed applications of rules to specific facts. On the other hand, the federal government is good at setting an overall policy framework and set of objectives, and the FCC is institutionally well-suited, because it is independent from Congress and psychologically distant from local or state politics, to play the “bad cop” in forcing necessary, but politically unpalatable reforms. In particular, this would entail expanding the FCC’s “forbearance” authority to allow it to

295. *Id.*

296. McTaggart, *supra* note 69, at 1.

297. Katz, *supra* note 113, at 36-37.

preempt unnecessary state and local regulation of information platforms where those regulations do not rise to the level of barriers of entry.²⁹⁸

ii. Interconnection

The layered model is helpful in allowing policymakers to systematically evaluate interconnection relationships between providers of different service layers. Sicker finds that interconnection resides at the very heart of the layered model. In his view, “[p]roviders of access, transport, and applications may be subject to varying interconnection obligations on terms defined by their market power.”²⁹⁹ In particular, the problem involves ensuring that there are appropriate interconnection arrangements between legacy networks and IP networks.

Nakahata notes that interconnection mandates address “network effects” as a source of market power, which is different from market power derived from control of underlying bottleneck facilities (as well as market power derived from access and interconnection on a vertical plane between layers). Given Metcalfe’s Law (the utility of a network equals the square of the number of users), Nakahata explains that antitrust authorities have expressed concerns about market power based on network effects alone.³⁰⁰ Government intervention typically involves mandating that the dominant party interconnect its network with others.

Entman observes that ideally, when a provider operates at multiple layers, public policy should keep interfaces open to interconnection at each layer. This would mean carriers should provide both horizontal interconnection (connecting with firms that compete at the same level) and vertical unbundling (giving competitors access to one layer without requiring access to other layers). However, it is not at all clear that such a mandate need apply absent the existence of persistent market concentration. As Entman states, “the importance of horizontal interconnection arises particularly at those levels within the [Physical Layer] at which bottlenecks occur: local access and interoffice transport.”³⁰¹

298. Nakahata, *supra* note 3, at 141.

299. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 20.

300. Nakahata, *supra* note 3, at 135.

301. Entman, *supra* note 77, at 16.

iii. Intercarrier Compensation

The current federal and state regulatory distinctions for different terminating carrier access rates (IXCs, ILECs, CLECs, wireless carriers, ISPs) already make little sense on their own terms. When imported into the IP world, these distinctions become even more nonsensical. The layers principle offers further compelling support for adoption of a uniform intercarrier compensation methodology, such as a “bill-and-keep” (no charges) regime, applicable to all forms of terminating traffic where at least one party is a regulated carrier. Where both parties are unregulated entities (such as ISPs), the FCC and the states have no regulatory jurisdiction, and market-based arrangements should prevail.

Weinberg states that access charge obligations need not turn on the telecommunications/information services distinction in the long run. Instead, “it makes sense to move access charges towards costs for telecommunications and information service providers alike. . . . Currently, information service providers do not pay access charges. That exemption should continue.”³⁰² It would not be sensible to extend the current subsidies in access charges to a new class of users, imposing distortions and inefficiencies on IP networks.

The notion of interstate rates versus intrastate rates (federal versus state jurisdiction) also faces a direct challenge from the IP world. The general concept of jurisdiction over the Internet—which, as discussed above, is alien to the very nature of IP protocols and the Internet “network of networks”—remains an area steeped in legal controversy and confusion. Application of the layers principle serves to emphasize, for example, that there is no obvious state role in regulating intercarrier compensation rates for facilities carrying IP-based applications.

iv. Universal Service

Under the auspices of Section 254 of the Telecommunications Act, the FCC has adopted a federal universal service fund (“FUSF”).³⁰³ The contribution mechanism promulgated by the Commission assesses charges based on a particular carrier’s total interstate retail telecommunications revenues.³⁰⁴ In a market environment of bundled offerings including services of different regulatory treatment and jurisdiction, however, the FCC’s contribution mechanism is increasingly difficult if not impossible to

302. Weinberg, *supra* note 2, at 239.

303. 47 U.S.C. § 254 (2000).

304. Fed.-State Joint Bd. on Universal Serv., *Report and Order*, 12 F.C.C.R. 8776, para. 40 (1997).

apply in a rational manner. The IP world changes the equation even more radically.

Over the past three years, certain parties have advocated doing away with the FCC's current revenue-based contribution mechanism in favor of a flat-rate proposal that relies on a consumer's physical connections to a public network. Such an approach is more consistent with the bundled environment and the ways that consumers access and utilize networks.³⁰⁵ The connections-based approach finds further support in the layers principle, as it meshes nicely with the common sense focus on the Physical Layer rather than particular applications and services at the upper layers. John Nakahata agrees that the layered approach helps frame the issue of how to pay for universal service.³⁰⁶ A connections-based approach:

holds the promise of moving universal service contribution into a layered approach by emphasizing the [P]hysical [L]ayer. A connection need not be a telecommunications service connection, an information service connection, or a video connection. A connection can be any connection to an information platform that interconnects with other information platforms. Thus, while a connection-based approach to contribution also faces definitional issues, it has the potential to provide a funding base that is more consistent with the convergence of the information platform.³⁰⁷

Behind the connections-based approach is the concept of associating universal service payments not with service provision, but instead with the physical facilities along which the information moves. Weinberg suggests that a payment obligation tied to the ownership of qualifying facilities could apply without regard to whether the information moving via those facilities was in digital or analog form, or was packet- or circuit-switched. Specifically, "[t]o the extent that the high-cost fund is designed to support the availability of physical infrastructure throughout the nation, it provides a nice symmetry to impose the associated costs on physical infrastructure. More consequentially, the approach would be technology-neutral."³⁰⁸

In Douglas Sicker's model, funding for universal service also would come from the providers of the physical networks. By separating out the applications and content from the physical network on which they ride, important social policies can be aligned with the economic reality of

305. See Fed.-State Joint Bd. on Universal Serv., *Comments of WorldCom, Inc.*, CC Docket No. 96-45, at 18-23, available at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513583157 (Feb. 28, 2003).

306. See Nakahata, *supra* note 3, at 138.

307. *Id.* at 140. At one time Mr. Nakahata represented CoSUS, a coalition of carriers and end users advocating that the FCC adopt a connections-based contribution mechanism for the federal USF regime.

308. Weinberg, *supra* note 2, at 235.

servicing under-served areas.³⁰⁹ After all, “[u]niversal service is about building networks and providing services to the [underserved]. The distance sensitive aspect of building a network does not apply to the application space.”³¹⁰ Additionally, the point of applying a layered model to Universal Service is that it separates the distance sensitive component (the physical network) from the non-distance sensitive component (the application or content).³¹¹ Under this model, VoIP would not be subject to Universal Service requirements because the USF subsidy should both apply to, and be recovered from, telecommunications services like broadband platforms.

Michael Katz writes that his concept of “de-lamination” also raises the issue of which layers are covered by Universal Service. While the definition under Section 254 of the Act appears to apply to the transport layer, the FCC’s policies typically are expressed in terms of the voice application coupled with the underlying transport network required to offer voice services using a circuit-based technology. Concerning consumers in “high-cost areas,” Katz believes a sensible policy might subsidize the high costs associated with the transport layer, while low-income consumers might receive subsidies for both transport and applications.³¹²

v. Consumer Welfare, Safety, and Accessibility Issues

Policymakers express concern about a host of consumer welfare obligations, including emergency services (such as 911 capability), law enforcement (such as the CALEA wiretapping requirements), and access for persons with disabilities. Needless to say, these are all legitimate social priorities, and should be taken seriously as the nation’s communications and information platforms continue to evolve. Nonetheless, there are ways of accommodating and even advancing these priorities without doing so within the stifling confines of the legacy legal construct.

Rather than rely solely on regulation to enforce certain accessibility requirements, for example, Sicker suggests that “government, industry and interested parties should work together to inform the [pertinent] service providers of the [general] needs and do so early [enough] in the development or deployment process to minimize the difficulties (cost, time or other) of supporting such needs.”³¹³ In many cases, these “social goods” can be dealt with in a manner that comports with the layers approach. In

309. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 21.

310. Sicker, *Applying for a Layered Policy Model*, *supra* note 95, at 3.

311. *Id.* at 6.

312. Katz, *supra* note 113, at 47.

313. Sicker, *Further Defining a Layered Model*, *supra* note 2, at 15.

particular, policymakers should endeavor to place the specific obligation at the lower physical layers as part of overall network requirements, and allow the market sufficient time to develop robust and efficient solutions. Those solutions in turn potentially could dwarf the technically-limited capabilities of current-day programs and services.

vi. Investment in New Networks

The FCC has taken the view—correctly or not—that one of the chief goals of the Telecommunications Act of 1996 is to encourage facilities-based competition generally, and the deployment of advanced service facilities specifically.³¹⁴ In the *UNE Triennial Review Order*, for example, the FCC read the Act's "impairment" standard as restricting BOC unbundling obligations for fiber-fed local loops and packet-switching capabilities, based on its stated concern that unbundling requirements would stifle BOC and CLEC economic incentives to invest in facilities-based deployment of advanced services.³¹⁵ As discussed previously, the FCC's view on BOC broadband deployment incentives also appeared to play a major role in its recent proposal to eliminate ISPs' rights to access BOC-provisioned DSL transmission services on a nondiscriminatory basis.³¹⁶

There are several fundamental flaws in the FCC's approach. First, the claimed legal distinction between loops used for voice services and loops used for broadband services, as well as copper-based loops versus fiber-based loops, is not at all clear. It appears that the FCC essentially decided to treat disparately the same last-mile BOC facilities, based solely on the underlying technology (Physical Layer) or end-user service (Applications Layer). A straightforward market power analysis would have been more productive, logical, and legally sustainable than taking liberties with the 1996 Act's "impairment" standard.

Second, the FCC's views on broadband investment incentives led it to remove carrier access rights entirely for certain network functionalities. Again, to the extent the Commission has valid concerns about such incentives, those concerns should be dealt with head-on through careful consideration of various economic factors, rather than the unbundling regime. Initially, as Willig and others point out, there is significant

314. See, e.g., *UNE Triennial Review Order*, *supra* note 240, paras. 3, 241-246 (encouraging investment in next-generation network architecture suitable for delivering advanced telecommunications capability is a critical policy objective).

315. *Id.* paras 255-85, 288.

316. See Part III.B.2.b, *supra*; *Broadband Framework NPRM*, *supra* note 261, paras. 3-5.

evidence that unbundling actually creates additional incentives for carriers to invest in network facilities.³¹⁷ In addition, to the extent BOC investment concerns are guided by UNE pricing concerns, the Commission now is in the process of considering various aspects of its TELRIC cost standard.³¹⁸ By using the appropriate financial tools, for example, any risk and options considerations can be handled by selecting the correct rate of return.³¹⁹

More to the point, the fundamental layering principle remains: focus on where the concern lies (investment in Physical Access Layer facilities), and then determine how best to achieve the goal without disrupting other layer-affecting objectives (such as facilitating competition between and across the layers). Applying the horizontal layers framework in this case could provide some unique incentives to achieve the FCC's stated objective. In particular, one plausibly could argue that the deregulatory nature of the framework itself would encourage companies to move existing applications to an IP platform, with all the salient gains in network externalities. Such incentives should lead to multiple providers constructing advanced networks and logical platforms at an accelerated pace.

vii. Retail Rate Regulation

Finally, Nakahata weighs in on the question of whether to continue regulating retail telecommunications rates at the state and federal level:

The only application that still has significant retail rate regulation is voice telephony. It is not at all clear that there is a compelling reason to continue retail rate regulation of voice telephony, provided that unbundling and resale policies are designed correctly at lower levels of the network and can actually be provisioned. Market pricing issues should be addressed with unbundling and resale policies. . . . At the very least, rate regulation . . . should be eliminated for application providers that truly lack market power.³²⁰

317. Robert D. Willig et al, *Stimulating Investment and the Telecommunications Act of 1996*, at 2-3. (Oct. 11, 2002) (submitted as *ex parte* filing by AT&T in Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, CC Docket Nos. 01-338, 96-98, 98-147) (on file with the Author).

318. Review of the Comm'n's Rules Regarding the Pricing of Unbundled Network Elements, *Notice of Proposed Rulemaking*, 18 F.C.C.R. 18945, paras. 1-3 (2003).

319. See Kenneth Baseman et al, *Depreciation and Capital Recovery Issues: A Response to Professor Hausman*, submitted as *ex parte* filing by MCI in CC Docket No. 96-98, July 24, 1996 (on file with the Author).

320. Nakahata, *supra* note 3, at 137. Nakahata believes that retail rate deregulation would greatly rationalize prices, and allow the market to innovate new ways of selling competitive services. *Id.* at 137-38.

Thus, a layers-based approach provides unique insights that, in this particular case, can lead to the deregulation of retail services that otherwise would be subject to regulation.

V. CONCLUSION

Layers analysis offers a fresh and compelling way to look at legacy U.S. legal and regulatory policies. In the e-commerce world, where ISPs face the prospects of legal liability for the actions of third parties using their network, a horizontal layers framework exposes the very real dangers of overzealous and ill-reasoned regulation at disparate layers. In the world of telecommunications regulation, the framework provides a valuable new mechanism for assessing harm from the exercise of undue market power, and suggesting practical alternatives. In particular, a layers model can assist policymakers in targeting regulation to foster needed competition at the core (or lower layers) of the network, while preserving and enhancing innovation at the edge (or upper layers). Well founded on fundamental engineering principles, and buttressed by economic analysis, the layers principle, as expressed in this Article's notion of a Network Layers Model, should be adopted by policymakers as a necessary and productive public policy tool.